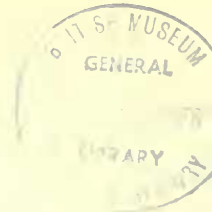


# A revision of the Oriental pod bugs of the tribe Clavigrallini (Hemiptera : Coreidae)

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## Synopsis

The morphological characteristics of the tribe Clavigrallini are outlined and its systematic position is discussed. Three genera, two of them new, are recognized in the Oriental region and are described and keyed. Nineteen species and four additional subspecies are recognized in the region and are described and keyed. Twelve of the species are new and two are revived from synonymy. All of the additional subspecies are new. Three new specific synonymies are established. Six lectotypes are designated.

## Introduction

Species of the tribe Clavigrallini are found almost throughout the Ethiopian and Oriental regions where they are known to economic entomologists as pod bugs or spiny brown bugs. This account is concerned with those species of the tribe which occur east of the Arabian Gulf, including peripheral populations or species whose ranges extend into the extreme southern edge of the Palaearctic region and into northern Australia and the Pacific.

The main recorded host plants of Clavigrallini are herbaceous Leguminosae of erect or ascending habit, and some species have the status of minor pests on pulse crops. Because they frequently occur in the field together with certain Alydidae it is often difficult to assess their importance as pests. Field studies have shown that most damage is caused by adult bugs feeding on the unripe pods. Bindra (1965) demonstrated that on *Cajanus cajan* Linnaeus (red gram, pigeon pea or tur) a density of ten adults per plant of *Clavigralla gibbosa* Spinola (the tur pod bug) could cause total or almost total loss of the crop.

## Systematic position

The tribe Clavigrallini was erected by Stål (1873 : 81) as division Clavigrallaria of subfamily Pseudophloeina (now Pseudophloeinae) of the family Coreidae, a systematic position which is accepted here.

The exact relationship between the family-group taxa related to the Coreidae cannot be established without further study. Recognizably monophyletic groups in this area are Alydinae, Microlytrinae and Leptocorisinae (often grouped together under Alydidae, which may be a paraphyletic grouping), Rhopalidae, Pseudophloeinae, Hydarinae and Coreinae (the last including family-group taxa based on *Colpura* Bergröth, *Agriopocoris* Miller and *Phyllomorpha* Laporte). Both Hydarinae and Pseudophloeinae share a number of character states with the Alydid subfamilies but these all appear to be plesiomorphies and thus without value in indicating phyletic relationship.

Pseudophloeinae may be distinguished from the other family-group taxa of Coreoidea by the following complex of characters: tibiae terete, not sulcate; metathoracic scent-gland peritreme with dorsal ridge entire or shortly bilobed, not drawn out into a Y-shaped auricle; antennae inserted at sides of head; antennifers with porrect or deflexed process at outer apical angles; rostrum at rest reaching metasternum; posterior coxae separated by about the width of a coxa or less; femora moderately to strongly clavate; posterior femora typically with two or more large subapical spines beneath on anterior side with some smaller spines, tubercles or granules between them and a terminal series of about four spines diminishing in length towards apex of femur; tibiae without apical spines; membrane of hemelytron with a compound vein near base almost parallel with apical margin of corium; posterolateral angle of sternite VII almost always and of sternites III–VI commonly produced into teeth or spines; female paratergite VIII without functional spiracle; first valvula of ovipositor without peg-like setae; spermatheca with bulb lunate and duct devoid of prominent flange; dorsal wall of gynatrium with a well-developed pair of sclerites each with a transverse, anterior arm and a longitudinal, medial arm, often with a descending, anterior arm or plate, never ring-shaped; basal apparatus of aedeagus without ventroposterior apodemes; paraphyses absent; conjunctiva and ejaculatory reservoir complex almost completely bilaterally symmetrical; vesica not protected by a helicoid sclerite ('spiral process'); egg not operculate or pseudoperculate, opening by a transverse eclosion rent.

In his original description of the tribe Clavigrallini, Stål (1873 : 81) indicated the convex scutellum, the absence of a basal tubercle from the base of the posterior femur, the posterior closure of the male genital capsule, the sinuate posterior margin of the propleuron near its posterolateral angle, the relative lengths of the antennal segments (III never longer than II) and the usually long spines at the posterolateral angles of the pronotum. Not all of these characteristics are universal in the tribe, however. All species of Clavigrallini can be distinguished from all other Pseudophloeinae on the basis of two character states: the posterior femur invariably lacks a basal tubercle and the metathoracic wing invariably has an atracheate antevannal vein. The latter condition was believed by Stål to be a subfamily character, but the antevannal is absent from three undoubted Pseudophloeine genera: *Hoplolomia* Stål, *Vilga* Stål and *Risbecocoris* Izzard. As the possession of an antevannal vein appears to be apomorphic for Pseudophloeinae as it is for Coreinae, the nominate tribe Pseudophloeini as at present constituted is presumed to be paraphyletic.

## Abbreviations of depositories

The specimens studied in the course of this revision are deposited in the various institutions whose names are abbreviated in the text as follows: South Australian Museum, Adelaide, South Australia (SAM, Adelaide); University of Queensland, Brisbane, Queensland, Australia (UQ, Brisbane); Universitetets Zoologiske Museum, Copenhagen, Denmark (UZM, Copenhagen); Institut für Pflanzenschutzforschung, Eberswalde, German Democratic Republic (IP, Eberswalde); Bernice P. Bishop Museum, Honolulu, Hawaii, U.S.A. (BPBM, Honolulu); Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands (RNH, Leiden); British Museum (Natural History), London, U.K. (BMNH, London); American Museum of Natural History, New York, U.S.A. (AMNH, New York); University Museum, Oxford, U.K. (UM, Oxford);

## Terminology and measurements

The segments of the antennae and rostrum are numbered I to IV starting with the most proximal segment. Lengths of antennal segments are measured from the nearest point to the proximal end of each segment where normal surface sculpture is evident. This eliminates variation in apparent length due to the variable degree of retraction of the bases of the segments into the preceding joints. The ring segment between segments III and IV is omitted from the measurements. The lengths of the segments of the rostrum are measured along the true dorsal surface, i.e. the surface seen when the insect is examined in ventral view with the rostrum at rest. The origin of the first segment is taken as the base of the labrum, which can be easily seen in this view, rather than the base of the first labial segment, which is usually obscured. For this reason, the segments are referred to as 'rostral' rather than 'labial' segments. In referring to the angles of the pronotum the term 'humeral angle' is avoided as it has been variously applied to the posterolateral angles, the posterolateral angles of the posterolateral lobes of the pronotum (which lie posterior to the posterolateral angles) and to the prescutellar angles. Similarly, the term 'humeral spine' is avoided.

In most cases where ranges and means of lengths or ratios of lengths are given the number of specimens measured is cited in the form '(n=x)'. Standard errors are not given because the calculations by which they are derived are based on the assumption of a normal distribution of observations about the mean, which is unlikely to occur in the case of museum material which often comprises series of varying length from several different populations.

Ratios are preferred to absolute measurements of length because by this means of presenting the data much of the variation due to overall body size is eliminated. There is no obvious indication of allometry in the material studied. In the ratios of lengths of antennal and rostral segments means only are used, as the addition of means and ranges for each segment would make the descriptions unnecessarily unwieldy. Where a particular ratio is of diagnostic importance it is treated separately, in full.

## Morphology of Clavigrallini

Comparative accounts of the morphology of a variety of Coreidae, including some Pseudophloeinae but not Clavigrallini, are given by Kumar (1965) and Schaefer (1965). Cobben (1968) studied the eggs of three members of the subfamily, including one African species of Clavigrallini and Materu (1972) described and discussed the morphology of adults and immature stages of two African pest species of Clavigrallini. The present account is based chiefly upon original observations on *Clavigralla gibbosa* Spinola, with additional observations on species of other genera of the tribe.

Antennae inserted at sides of head (Fig. 1) just above an imaginary line joining centre of eye to apex of tylus (the 'supercorn' position). Antennifer exteriorly at apex bearing a process whose form is constant within species-groups or genera but varies between them. All antennal segments elongate, segment IV with area of specialized sensory setae occupying nine-tenths or more of its length. Rostrum moderately long, reaching to but not beyond metasternum when at rest, segment III always the shortest. Head short (Fig. 1) to moderately elongate (Fig. 30). Bucculae always short and usually almost semicircular, rarely angulate. Ocelli raised on prominent tubercles and approximately equidistant from eyes and from one another. Preocellar pits usually small and indistinct, midline of frons with a pair of deep, narrow, parallel, longitudinal pits.

Pronotum in dorsal view roughly hexagonal, width of anterior margin approximately half width of posterior margin, greatest width across the slightly to strongly prominent posterolateral angles, each of which bears a slender spine. Posterior margin almost straight or slightly concave in front of scutellum, with a pair of prescutellar spines in front of anterior angles of scutellum. Scutellum with disc convex, often strongly so, with midline depressed and flanked by a row of granules (rarely spines in African species). Scutellum at base (see Fig. 71) with a pair of small knobs which appear to prevent posterior



margin of pronotum overriding scutellum (these knobs are invariably present and are unique to the tribe). Metapleural scent-gland opening (Figs 7, 37, 38) situated laterally and surrounded by a small evaporative area, dorsal ridge of auricle not drawn out into narrow arms but sometimes shortly bilobed (Fig. 37). Mesosternum and metasternum shallowly longitudinally sulcate throughout. All femora clavate, especially the posterior pair, which lack a basal tubercle. Anterior and intermediate femora with one or more small spines on ventral surface near apex anterior to midline, so positioned that tibia, when flexed against femur, lies just posterior to them. Posterior femur (Fig. 6) with a row of spines in this position, typically with two major spines with some smaller spines, tubercles or granules between them and a terminal series of four spines or tubercles diminishing in length towards apex of femur. Occasionally posterior femur with additional major spines, evenly spaced, with granules or tubercles between them, and a few small spines or tubercles posterior to midline so that flexed tibia lies between the two rows. Hemelytron (Fig. 8) narrow, apex of corium distinctly produced along costal margin. Membrane with about ten longitudinal veins distinguishable and with three basal cells delineated by tracheate longitudinal veins and compound transverse vein. Wing (Fig. 9) with typical Coreoid venation and additionally invariably with an atracheate antevannal vein parallel with and just anterior to first vannal fold, merging apically with *CuA*.

Abdominal terga I and II strongly sclerotized, demarcated from each other by a deep furrow marked internally by a fold but showing no flexibility at this suture; terga III–VI immovably fused together, but sutures not completely obliterated (Fig. 13); suture between terga II and III marked by a fold internally and showing some flexibility, that between VI and VII free at sides but fused in middle. Segments II–VI with outer laterotergites, III–VI also with inner laterotergites, longitudinal sutures between laterotergites and their neighbouring sclerites allowing free mobility, transverse sutures between laterotergites allowing less mobility. Tergum VII with imperfectly separated outer laterotergites but no inner laterotergites. Sternum I absent, II–V in male (Fig. 12) or II–IV in female fused immovably but with sutures visible, sutures between IV and V in male and between V and VI in both sexes allowing free mobility so that the sternite posterior to each suture can be partially retracted into the one anterior to it (Fig. 12). Sterna III–VII with posterolateral angles slightly (Fig. 11) to strongly and spinously (Fig. 40) produced. Sternum VII in female usually apically cleft in midline, cleft sometimes secondarily obliterated. Sterna II–VII with functional spiracles, III–VII with short trichobothria distributed in the usual Coreoid pattern.

Male abdominal segment VIII comprising a single sclerotized ring (Figs 12, 13) with or without a pair of scars marking position of rudimentary, non-functional spiracles. Genital capsule (segment IX) (Figs 12, 13, 22) usually with a broad, posterior lip completely filling posterior emargination and with a triangular (Fig. 68), truncate (Figs 69, 70) or trifid (Fig. 22) tongue. Parameres with narrow shaft and broader blade, never club-shaped, blade often flattened. Parandria or paraphyses absent. Basal plate and associated structures (Fig. 19) of usual form but lacking ventroposterior apodemes. Internal ligaments of aedeagus ('hyaline band') complex. Phallosome (Figs 19–21) with two narrow, parallel, longitudinal dorsal sclerites and a broad, ventral sclerite. Conjunctiva (Figs 19–21, 53, 54, 82–84) with various lobes which may be all membranous or wholly or partly sclerotized. Ejaculatory reservoir (Fig. 20) symmetrical, bearing a symmetrical pair of long, spreading wings to which are articulated near the base two long, symmetrical, descending straps. Vesica rather stout, internally sclerotized, with two fairly tight, helicoid turns at base, otherwise not coiled, flanked at base by a pair of roughly equal sized and more or less symmetrical sclerites arising from posterior wall of conjunctiva. These sclerites, which may be fused together, are homologous with the 'spiral (or helicoid) process of the vesica' in higher Coreidae. Immediately below these sclerites arise the contiguous, paired, roughly globular apical ventral lobes. Lateral to the apical ventral lobes arise the distal ventrolateral lobes, which are usually the largest lobes of the conjunctiva and are frequently subdivided. Sometimes their posterior faces are sclerotized to a greater or lesser degree. Directly above the distal ventrolateral lobes arise the distal dorsolateral lobes which may be rudimentary (Figs 19, 20) or well developed in which case they may be entirely membranous (Figs 53, 54) or the apices of the wings of the ejaculatory reservoir complex may be produced along their ventroposterior surfaces as a sclerotized strip (Figs 82–83). In those cases where the wings are not so produced they terminate in the conjunctival wall just below the origin of the distal dorsolateral lobes (Fig. 20). Dorsally between the distal dorsolateral lobes arises the distal dorsomedian lobe from the anterior side of which, near the base, may arise the intermediate dorsal lobe. Anterior to the distal dorsomedian and intermediate dorsal lobes lies the dorsomedian lobe, a transverse ridge whose dorsolateral angles are frequently produced (Fig. 18) and sometimes sclerotized (Figs 19, 20). Ventrally, close to the point where the straps of the ejaculatory reservoir complex terminate just within the conjunctival wall, may arise a pair of small, membranous or sclerotized, ventral lobes (Figs 18, 20, 21). Other lobes may be present, for example the paired, T-shaped lobes arising from the posterior face of the conjunctiva in *Clavigralla scutellaris* (Westwood) or the lateral protuberances associated with the dorsomedian lobe in *Gralliclava* species (Fig. 83).



In the female, suture between terga VII and VIII allows some flexibility, especially at sides; tergum IX hinging freely on VIII. Segments X and XI modified into a retractile anal tube which may be protracted posteriorly where tergum IX is horizontal (Figs 23, 27) or ventrally where tergum IX is deflexed (Figs 87, 88). Sternum VIII represented by a pair of triangular or quadrate paratergites fused dorsally with tergum VIII and bearing rudiments of the non-functional spiracles. First valvifer (gonocoxa VIII) broad, roughly quadrate, first valvula (gonostylus VIII) triangular, without peg-like setae, with a broad, membranous articulation to valvifer, its ramus fused apically to gonangulum (Figs 26, 89). Sternum IX represented by a pair of paratergites without spiracles, fused dorsally with tergum IX and prolonged anteriorly as gonangulum of each side. Second valvifer (gonocoxa IX) long, second valvula (gonostylus IX) oblong, shape often diagnostic at species level (Figs 55–57, 90–102). Spermatheca usually with bulb narrowly lunate and duct short, not convoluted, communicating with gynatrial sac (Figs 27, 86). Gynatrial sac supported by posteriorly projecting inner arms of sclerites of anterior wall of gynatrium. Anterior, laterally spreading arms of sclerites of gynatrial wall terminating at junction of second valvulae and rami (Figs 27, 88).

Sculpture of integument consisting usually of round punctures and granules or tubercles. Granules and tubercles each bearing, apically or subapically, a single hair. Posterior part of pronotum and thoracic pleura often with granulate-punctate sculpture in which a puncture lies immediately posteriad of each granule.

Pubescence of three types: (1) erect, suberect or semidecumbent, usually colourless or pale brown or amber, simple hairs; (2) semidecumbent or decumbent, flattened, silvery or golden-hairs which, if long, are usually tomentose; (3) densely felted, white hairs in lines or patches, found only in *Gralliclava*.

Egg with fewer than ten, usually six or seven aeromicropyles, oblong-ovate, slightly flattened on dorsal surface.

## Systematic section

### Key to Oriental genera of *Clavigrallini*

- 1 Pronotum (Figs 67, 71) without large tubercles on disc or at sides; female abdomen with apex (Figs 85–88) deflexed . . . . . **GRALLICLAVA** gen. n. (p. 304)
- Pronotum (Figs 2–5, 31–36) with large tubercles on disc or at sides; female abdomen with apex (Figs 23, 27) not deflexed . . . . . 2
- 2 Pronotum (Figs 31–36) with a group of four large tubercles on disc  
**CLAVIGRALLOIDES** gen. n. (p. 293)
- Pronotum (Figs 2–5) with a pair of large tubercles near lateral margins behind level of calli  
**CLAVIGRALLA** Spinola (p. 285)

### *CLAVIGRALLA* Spinola

*Clavigralla* Spinola, 1837 : 200. Type-species: *Clavigralla gibbosa* Spinola, 1837, by monotypy.

*Note.* Character states given in parentheses below are restricted to non-Oriental species.

Form oblong, robust (rarely somewhat depressed), connexivum broadest in middle; aspect slightly (to strongly) spinose.

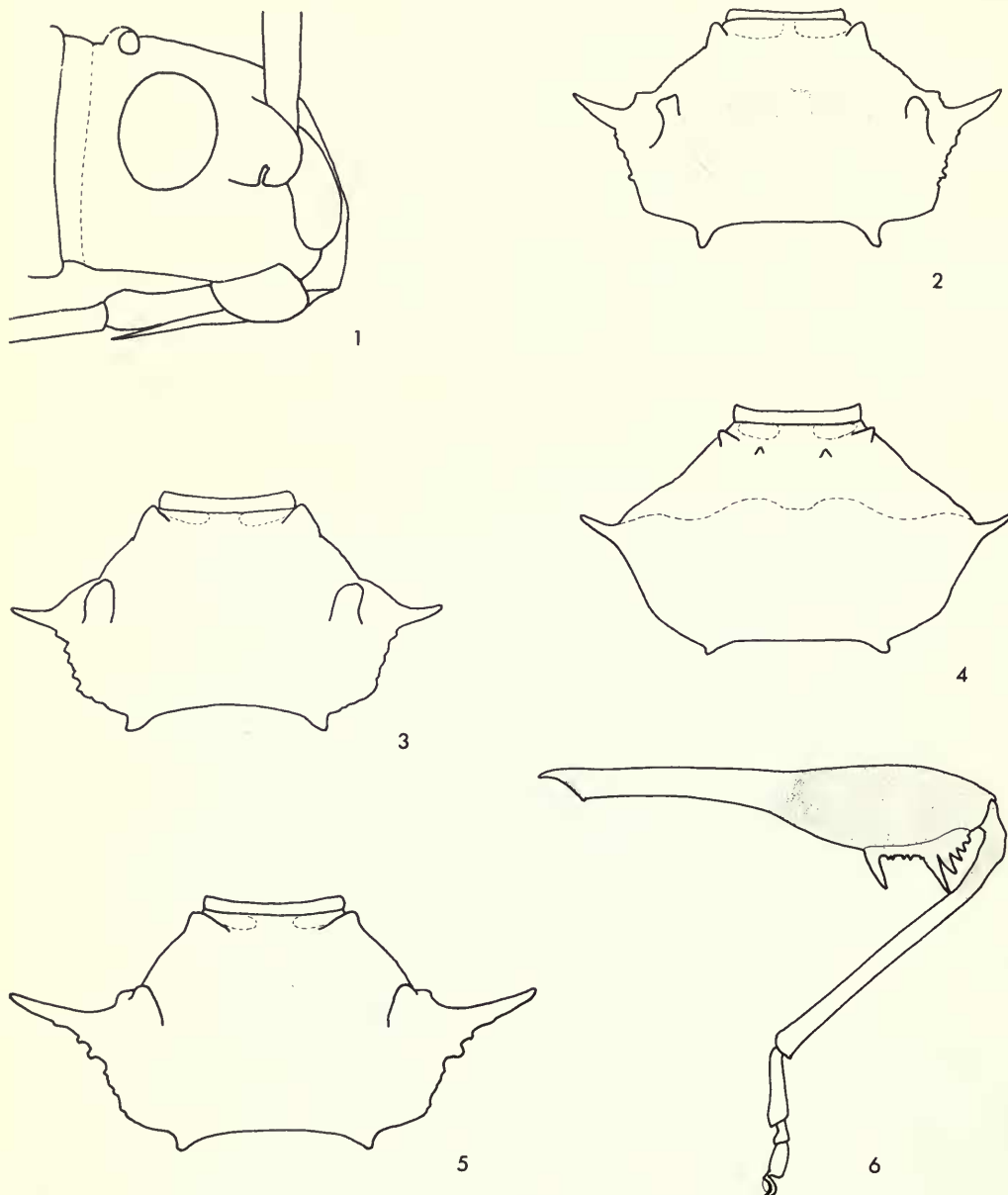
Head between one-half and three-quarters as long as pronotum. Antennifers very slightly (to strongly) divergent, process at outer apical angle broad and strongly deflexed, its apex touching maxillary plate (or short, triangular and porrect). Antennae with segment I or IV longest, II or III shortest, IV elongate fusiform, area of specialized sensory setae occupying about 95 per cent of its length, II and III more slender than I or IV. Rostrum with segment III always the shortest, its apex when at rest reaching disc of metasternum. Bucculae occupying about one-quarter of length of ventral midline of head.

Pronotum strongly (or rather strongly) declivent anteriorly, posterolateral angles weakly (to very strongly) produced, each bearing a slender spine; posterior margin in front of scutellum straight, pre-scutellar angles each marked by a short spine; disc with or without small spines, never with a group of four short, stout tubercles, with a pair of short, stout tubercles close to lateral margins about halfway between collar and posterolateral angle (these tubercles rarely absent). Scutellum equilateral or slightly longer than its basal width, apex slightly produced, disc (weakly to) strongly convex, midline impressed. Mesosternum and metasternum broadly sulcate in midline. Metapleural scent-gland orifice with dorsal ridge of peritreme entire, shortly reniform (or bilobed). Corium with apex somewhat produced, reaching posteriorly to laterotergite V or VI at rest. Wings with antevannal vein well developed. Anterior and

intermediate femora with 0-1 (-2) small subapical spines beneath, posterior femur with 2 (-3) major subapical spines beneath, some small spines, tubercles or granules between them and a terminal series of four spines.

Abdominal sterna III-VII weakly (to very strongly and spinously) prominent.

Male genital capsule with lip (narrow or) broad, filling (or not filling) posterior emargination, tongue apically trifid (or entire, acute). Phallosome with a large, ventral sclerite and two narrow, parallel, dorsal sclerites. Lobes of conjunctiva variously developed, with some lobes or processes sometimes weakly or



**Figs 1-6** *Clavigralla* species. (1) *gibbosa*, right lateral view of head; (2) *gibbosa*, dorsal view of pronotum; (3) *orientalis orientalis*, same; (4) *scutellaris*, same; (5) *orientalis serica*, same; (6) *gibbosa*, posterior view of posterior femur, tibia and tarsus. Dotted or dashed line in Figs 2-5 indicates boundary between anterior area of pale coloured pubescence and posterior area of dark coloured pubescence.

strongly sclerotized. Ejaculatory reservoir complex symmetrical, with wings and straps well developed, sclerites protecting base of vesica paired, slightly asymmetrical but of comparable size.

Spermatheca with bulb narrowly lunate, duct simply looped or slightly (to considerably) convoluted. Second valvulae and sclerites of gynatrial wall variable in form. Tergum IX of female in same plane as rest of abdominal tergites, anus directed posteriad.

**REMARKS.** Oriental species differ from those of the other two Oriental genera in the presence of a pair of short, stout tubercles close to the lateral margins of the disc of the pronotum, and the absence of any other similar tubercles on the disc. All Oriental (and many Ethiopian) species have a well-marked division of the pubescence of the pronotum into a white or yellowish white anterior area and a brown posterior area.

**DISTRIBUTION.** The majority of the species are restricted to the Ethiopian region and adjacent islands, but a few are present in the Oriental region from Pakistan and Ceylon to China and Java.

### Key to Oriental species

- 1 Junction between anterior area of pale pubescence and posterior area of dark pubescence on pronotum following a gently undulating line (Fig. 4). (India except the north-eastern part, Pakistan; also in southern Arabia and north-eastern Ethiopian region)
  - Junction between areas of pale and dark coloured pubescence on pronotum following a strongly undulating line (Figs 2, 3, 5) . . . . . *C. scutellaris* (Westwood) (p. 291)
- 2 Male paramere (Fig. 14) with blade large. (Ceylon and peninsular India except the north-eastern part) . . . . . *C. gibbosa* (Spinola) (p. 287)
- Male paramere (Figs 15, 16) with blade small. (North-eastern India, S. China and south-eastern Asia) (*C. orientalis* sp. n.) . . . . . 3
- 3 Antenna with segment IV distinctly shorter than segment I; width of pronotum across tips of posterolateral spines divided by width of head including eyes in male less than 3.0, in female less than 3.2. (Northern India and Burma south-eastwards to Java)
  - Antenna with segments I and IV subequal in length; width of pronotum across tips of posterolateral spines divided by width of head including eyes in male greater than 3.0, in female greater than 3.1 (S. China) . . . . . *C. orientalis orientalis* subsp. n. (p. 290)
  - Antenna with segments I and IV subequal in length; width of pronotum across tips of posterolateral spines divided by width of head including eyes in male greater than 3.0, in female greater than 3.1 (S. China) . . . . . *C. orientalis serica* subsp. n. (p. 291)

### Descriptions of Oriental species

#### *Clavigralla gibbosa* Spinola

(Figs 1, 2, 6–10, 12–14, 19–24, 26, 27)

*Clavigralla gibbosa* Spinola, 1837 : 202. LECTOTYPE ♀, INDIA: Bombay (Castella di Tassarolo, Novi Ligure, Genoa), here designated [photographs examined].

Length: ♂, 8.1–8.9 mm, mean 8.6 mm (n=5); ♀, 9.2–10.8 mm, mean 9.9 mm (n=10).

Antennifers very slightly divergent, almost parallel, outer apical angles each with a broad, deflexed process (Fig. 1). Ratio of lengths of antennal segments I : II : III : IV about 1.00 : 0.75 : 0.68 : 1.04 in male, in female about 1.00 : 0.77 : 0.69 : 0.99; length of segment I divided by width of head including eyes in male 1.26–1.34, mean 1.30 (n=7), in female 1.18–1.36, mean 1.27 (n=10). Ratio of lengths of rostral segments I : II : III : IV in both sexes about 1.00 : 0.95 : 0.74 : 1.14.

Pronotum (Fig. 2) strongly declivent anteriorly, posterolateral angles each with a slender, antero-laterally curved spine. Width across tips of spines divided by width of head including eyes in male 2.65–2.80, mean 2.75 (n=6), in female 2.63–3.02, mean 2.89 (n=10). Scutellum equilateral, strongly convex, granulate, with midline impressed. Metathoracic peritreme (Fig. 7) with dorsal ridge about as high as wide, entire. Corium with apex slightly produced, reaching apex of laterotergite V at rest. Anterior and intermediate femora without subapical spines beneath, posterior femur (Fig. 6) with two major spines, about five very small spines or granules between them and an apical series of four spines. Posterior tibia (Fig. 6) slightly curved at base, about three-quarters as long as posterior femur.

Abdominal sternae III–VII with posterolateral angles prominent as short, triangular teeth (Fig. 10). Male genital capsule (Figs 12, 13, 22) with lip high, broad, filling posterior emargination, tongue trifid at apex. Paramere (Fig. 14) with blade very broad. Phallosome (Figs 19, 20, 21) comprising a broad sclerite ventrally and laterally and two slender, parallel, longitudinal sclerites dorsally. Conjunctiona



(Figs 19, 20, 21) with dorsomedian lobe low, flat-topped, bearing a pair of large, sclerotized appendages at its dorsolateral angles; intermediate dorsal lobe small, membranous, conical; distal dorsomedian lobe large, membranous, with a posteriorly directed, membranous, finger-like appendage; distal dorsolateral lobes obsolete; apical ventral lobes rounded, membranous; distal ventrolateral lobes well developed, membranous; ventral lobes well developed, sclerotized throughout. Sclerites protecting base of vesica paired, separate, the right one very small. Ejaculatory reservoir complex symmetrical, wings and straps both long. Female abdominal sternite VII divided for rather more than apical one-third of its length. First valvulae pointed; second valvulae narrow, apically rounded; sclerites of gynatrial wall V-shaped with median arms lanceolately broadened for apical three-quarters of their length (Figs 23, 26, 27). Spermatheca (Fig. 24) with bulb about three-quarters as long as the apically attached duct; broad, thin-walled portion of duct about one-quarter as long as narrow, thicker walled part.

Head and antennae very weakly granulate. Pronotum with disc punctate, margins near posterolateral angles strongly granulate to tuberculate; scutellum granulate; thoracic pleura weakly granulate-punctate, sterna minutely roughened; legs very weakly granulate; clavus strongly seriatly punctate, corium weakly and sparingly punctate, veins granulate proximally. Abdominal pleura and abdominal laterotergites minutely roughened, terga I and II transversely rastrate, III–VII punctate, the punctures largest on disc of III, becoming smaller towards lateral margins and towards apex of abdomen, very small on tergite VII.

Head with short to long, pale amber to colourless, erect hairs and dense, short, silvery, decumbent pubescence. Antennal segment I with moderately long to long, suberect, pale amber hairs and sparse, short, decumbent, silvery pubescence; segments II and III with short, semidecumbent pale amber hairs. Declivent part of pronotum with long, erect, pale amber hairs and dense, long, tomentose, yellowish white pubescence, posterior level area of pronotum with dense, decumbent, golden brown pubescence with some longer, erect, pale amber hairs interspersed with it, especially on and near margins, junction of declivent and level areas of pronotum with three tufts of dense, rather short, erect, brown pubescence with the paler tomentose pubescence typical of the declivent area extending between the tufts; general effect of this distribution of types and colours of pubescence is of a pale, anterior, declivent area and a dark, posterior, level area, the junction between the two areas of colour being sharply demarcated by a strongly undulating line (dotted line on Fig. 2). Scutellum with long, erect, slightly crisped and flattened pubescence, silvery posteriorly grading to brown anteriorly. Thoracic pleura with long, erect, colourless hairs and dense, decumbent, silvery pubescence, sterna with short, sparse, decumbent, silvery hairs only. Clavus and corium with short, slightly crisped, semidecumbent silvery hairs intermingled with short, suberect, brown hairs. Legs with moderately long, suberect to erect, pale amber or colourless hairs, femora also with short, decumbent, silvery pubescence. Abdominal sterna with short, decumbent, slightly tomentose, silvery pubescence and moderately long to long, pale amber or colourless pubescence. Outer laterotergites with short, semidecumbent, silvery to golden-brown pubescence.

Head, thorax and abdomen reddish-brown. Antennae stramineous, segments I and IV suffused with reddish brown. Spines of pronotum, disc of scutellum, projecting angles of abdominal sterna, anterior midline of pronotum, thoracic sterna, parts of pleura and often some large patches at sides and midline of abdominal sterna brown to piceous. Femora with basal half stramineous, often with a row of piceous spots ventrally, apical half reddish brown faintly variegated with stramineous; tibiae stramineous, suffused with pale reddish brown at base and apex, broad, basal annuli of posterior tibiae darker reddish brown; tarsi stramineous. Clavus stramineous; corium in basal half stramineous with a few small, brown or piceous spots, in apical half piceous or brown variegated with paler, reddish brown spots, produced apex of corium reddish brown without paler markings; membrane faintly and irregularly suffused with brown in basal half, extreme bases of two of its longitudinal veins and a few discrete spots between veins brown to piceous. Abdominal laterotergites III–V anteriorly with a very narrow stramineous transverse band, VI and VII very broadly stramineous anteriorly, otherwise reddish brown like the rest of the body. Tergites I–V reddish brown to piceous, VI and VII stramineous with red-brown or piceous markings.

Ovarian egg oblong-oval with one to two aeromicropyles above and four to five below eclosion slit.

**REMARKS.** This is the 'Tur Pod Bug' of Indian entomologists. For accounts of the biology and bionomics of this species see Choudhary (1969) and especially Bindra (1965). The insect is a minor pest of various leguminous crops, feeding on the unripe pods. The most frequently recorded hosts are *Cajanus cajan* (L.), *Dolichos lablab* L. and *Vigna sinensis* (L.) (pigeon-pea, lablab and cowpea). Two species of *Hadronotus* (Hymenoptera, Scelionidae) have been recorded as parasites of the eggs. Rawat et al. (1969) record nymphs and adults of a predatory mite, *Bochartia* sp., attached to the bodies of nymphs and adults of *C. gibbosa*. Mathur & Thakar

(1969) investigated the digestive enzymes of this bug. Kurup (1964) gives an account of the structure and histology of the gut. There has been some confusion over the name of this bug, arising from the error of Fletcher (1914) whose text-fig. 361 bears the name '*Clavigralla gibbosa*' but in fact depicts *C. scutellaris* (Westwood) while the true *gibbosa* appears in his text-fig. 362 as '*Clavigralla horrens*'. Among Oriental species of the genus, *C. gibbosa* may be distinguished from *C. scutellaris* by the strongly undulating line along which the anterior pale area of pronotal



**Figs 7-13.** *Clavigralla* species. (7) *gibbosa*, lateral view of left metathoracic peritreme; (8 & 9) *gibbosa*, hemelytron and wing; (10) *gibbosa*, ventral view of left abdominal margin; (11) *scutellaris*, same; (12 & 13) *gibbosa*, lateral and dorsal views of male abdomen.

pubescence meets the posterior dark area. This junction follows a weakly undulating line in *scutellaris*. From *C. orientalis* sp. n. it is distinguished by the relatively longer segment III of the rostrum and the characteristic shape of the male paramere.

DISTRIBUTION. Ceylon and peninsular India except for the north-eastern part.

MATERIAL EXAMINED. *Clavigralla gibbosa* Spinola, lectotype ♀, INDIA: Bombay (*D. Dupont*) (photographs of specimen in Spinola collection, Castella de Tassarolo, Novi Ligure, Genoa, examined).

SRI LANKA: 1 ♀, Maha Illuppallama, Dry Zone Research Station, 3.ii.1959, on *Cajanus cajan* (BMNH, London). INDIA: 2 ♂, 7 ♀, Mysore, Chikballapur (*T. V. Campbell*) (BMNH, London and RNH, Leiden); 1 ♂, 4 ♀, Mysore, Bangalore (*Cameron*) (BMNH, London); 2 ♂, 4 ♀, Mysore, Bangalore (*Atkinson*) (UM, Oxford); 1 ♂, Madras, Utakamand (*Atkinson*) (UM, Oxford); 2 ♀, Madras, Kodaikanal (*Campbell*); 1 ♂, 1 ♀, Madras, Madurai, Alagar Kovil, 17–18.iii.1936 (*BM–CM Expedition*); 1 ♀, Madras, Coonor Ghaut, Burliyar, 3000 ft (1000 m), 17.iv.1937 (*BM–CM Expedition*); 1 ♂, Madras, Biligirirangan Hills, Dhimbam, 29.iv.1937 (*BM–CM Expedition*); 1 ♂, Madras, Coimbatore, Bolamputti Valley, 20.iv.1937 (*BM–CM Expedition*) (all in BMNH, London); 1 ♂, Madras, Coimbatore, 1400 ft (430 m) v.1960 (*P. Susai Nathan*) (RNH, Leiden); 1 ♀, Andhra Pradesh, Krishna, Vijayawada [as Bezwada], 30.xii.1908, on *Cajanus cajan* [as Red Gram] (*T. V. R.*); 1 ♂, Maharashtra, Bombay (ex *Distant* coll.); 2 ♀, Maharashtra, Bombay (*W. Elliott*) (all in BMNH, London); 3 ♀, 'E. Ind.' (*Bacon*) (UM, Oxford).

### *Clavigralla orientalis* sp. n.

(Figs 3, 5, 15, 16)

Length: 7.8–10.0 mm.

Very similar in appearance to *C. gibbosa*. Ratio of lengths of segments of rostrum about 1.00 : 0.96 : 0.66 : 1.17. Pronotum (Figs 3, 5) with posterolateral spines directed laterally or somewhat anterolaterally, rarely angled as far forward as those of *gibbosa*. Paramere (Figs 15, 16) with blade much smaller and narrower than that of *gibbosa*.

REMARKS. Distinguishable from *gibbosa* with certainty only by the shape of the male parameres. Segment III of rostrum generally shorter than in *gibbosa*.

DISTRIBUTION. Two subspecies, one in northern India, Burma and south-east Asia, the other in southern China.

### *Clavigralla orientalis orientalis* subsp. n.

(Figs 3, 15)

Length: ♂, 7.8–8.9 mm, mean 8.5 mm ( $n=11$ ); ♀, 8.7–10.0 mm, mean 9.3 mm ( $n=14$ ).

Ratio of lengths of antennal segments I : II : III : IV in male about 1.00 : 0.69 : 0.59 : 0.95, in female about 1.00 : 0.71 : 0.59 : 0.93; length of segment I divided by width of head including eyes in male 1.25–1.48, mean 1.34 ( $n=12$ ), in female 1.25–1.39, mean 1.30 ( $n=14$ ). Pronotum (Fig. 3) with spines of posterolateral angles directed laterally with slight forward curvature, width across tips of spines divided by width of head including eyes in male 2.76–2.94, mean 2.83 ( $n=8$ ), in female 2.87–3.17, mean 3.02 ( $n=11$ ). Male paramere as in Fig. 15.

REMARKS. Differs from the other subspecies chiefly in its shorter pronotal spines and shorter antennal segment IV.

DISTRIBUTION. Northern India, Burma and Indochina south-eastwards to Java.

MATERIAL EXAMINED. Holotype ♂, INDIA: Uttar Pradesh, Kumaon, S. Garhwal, 2000 m [as 6500 ft] (*H. G. Champion*) (BMNH, London).

Paratypes. INDIA: 1 ♀, Uttar Pradesh, Ranikhet, Bhatkot (*H. G. Champion*); 1 ♀, Uttar Pradesh, Kumaon, Nainital (*H. G. Champion*); 1 ♀, Uttar Pradesh, Chakrata, Jaunsar, v.1929 (*H. G. Champion*); 1 ♂, Bihar, Pusa, 28.vi.1915 (*Govt entomologist*); 1 ♀, Bihar, Shahabad (all in BMNH, London). BURMA: 1 ♂, 1 ♀, Tenass Valley (*Doherty*) (BMNH, London). LAOS: 1 ♀, Borikhame, Pakkading, 15–31.viii.1965 (*native collector*) (BPBM, Honolulu). VIETNAM: 1 ♀,



Tonkin, 1.vi.1908 (*R. V. de Salvaza*) (BMNH, London). THAILAND: 1 ♂, Bangkok, 13.ii.1961, on *Cajanus cajan* (BMNH, London). JAVA: 4 ♂, 2 ♀, Dramaga, Bogor [as Buitenzorg], 17.x.1936 (*J. v. d. Vecht*) (BMNH, London and RNH, Leiden); 2 ♂, 3 ♀, Semarang, 13.viii.1926 (*Fr. A. Th. Verbeek*) (RNH, Leiden and BMNH, London); 1 ♂, 2 ♀, Bogor [as Buitenzorg] 250 m, x.1936, on *Cajanus cajan* (*J. v. d. Vecht*); 1 ♂, Batoerraden, G. Slamet, 800 m, vi.1937 (*F. C. Drescher*); 1 ♀, Djeroeklegi, S. Banjoemas, 29.v.1932 (*F. C. Drescher*) (all in RNH, Leiden).

*Clavigralla orientalis serica* subsp. n.

(Figs 5, 16)

Length: ♂, 8.8–8.9 mm (n=2); ♀, 8.6–9.7 mm, mean 9.3 mm (n=8).

Ratio of lengths of antennal segments I : II : III : IV in male about 1.00 : 0.70 : 0.59 : 1.01, in female about 1.00 : 0.73 : 0.62 : 1.00; length of segment I divided by width of head including eyes in male 1.29–1.31 (n=2), in female 1.18–1.35, mean 1.26 (n=7). Pronotum (Fig. 5) with spines of posterolateral angles long, directed laterally or slightly anterolaterally, width across tips of spines divided by width of head including eyes in male 3.15–3.44 (n=2), in female 3.14–3.52, mean 3.35 (n=5). Paramere (Fig. 16) very similar to that of subsp. *orientalis*.

REMARKS. Distinguishable from the nominate subspecies by the longer pronotal spines and the longer antennal segment IV. An account of the biology and descriptions of the various stages of the life cycle of this subspecies (under the name of *Clavigralla gibbosa*) are given by Hoffmann (1933), who records it feeding and breeding on *Aeschynomene indica* L. (Leguminosae).

DISTRIBUTION. Southern China.

MATERIAL EXAMINED. Holotype ♂, CHINA: Fukien, Shaowu, Aotow, x.1941 (*T. C. Maa*) (BPBM, Honolulu).

Paratypes. CHINA: 1 ♀, Fukien, Chianglo, 6.ix.1940 (*Maa*); 1 ♀, Fukien, Lo Fou Mountains, Put Wan Tze, 3520 ft (1070 m), 28–29.x.1906 (both in BPBM, Honolulu); 2 ♂, 3 ♀, Fukien, Chung An, Bohea Hills, 23.vii.1939, 31.vii.1939, 6.x.1940 (*Maa*) (BPBM, Honolulu and BMNH, London); 1 ♀, Fukien, Amoy, 1922 (*S. F. Light*); 1 ♀, Kwangtung, P'an-yu District, Honam Island, 7.iv.1935 (*W. E. Hoffmann*) (both in BMNH, London).

*Clavigralla scutellaris* (Westwood)

(Figs 4, 11, 17, 18, 25)

*Coreus scutellaris* Westwood, 1842 : 24. LECTOTYPE ♂, INDIA (UM, Oxford), here designated [examined].

*Acanthomia brevirostris* Stål, 1873 : 82. LECTOTYPE ♀, SUDAN (NR, Stockholm), here designated [examined]. Syn. n.

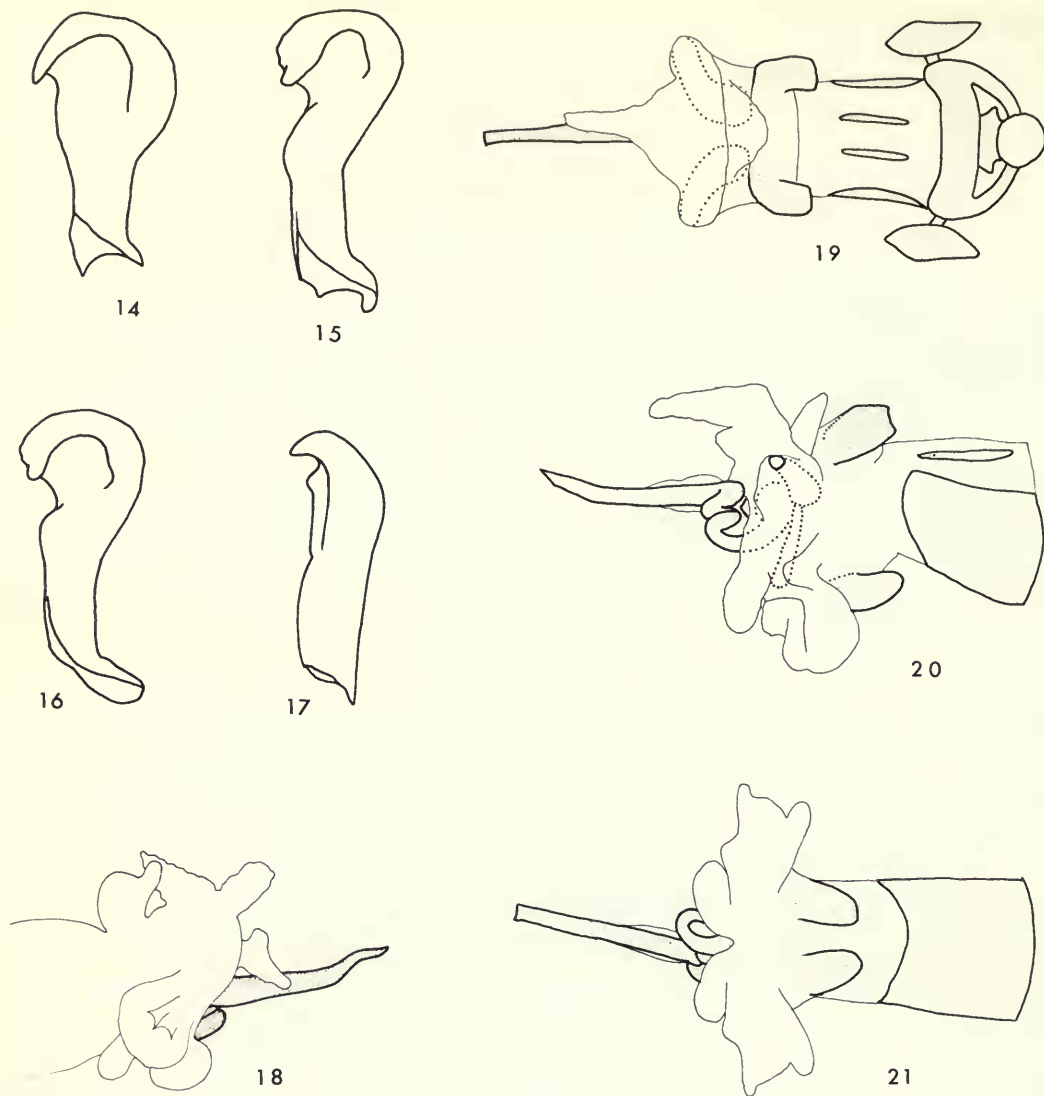
*Clavigralla scutellaris* (Westwood) Dallas, 1852 : 514.

Length: ♂, 8.7–10.3 mm, mean 9.6 mm (n=14); ♀, 9.8–12.2 mm, mean 10.8 mm (n=18).

Antennifers slightly divergent, outer apical angles each with a broad, deflexed process. Ratio of lengths of antennal segments I : II : III : IV in male about 1.00 : 0.84 : 0.71 : 1.04, in female about 1.00 : 0.85 : 0.72 : 0.99; length of segment I divided by width of head including eyes in male 1.18–1.39, mean 1.28 (n=14), in female 1.15–1.38, mean 1.26 (n=18). Ratio of lengths of rostral segments I : II : III : IV in both sexes about 1.00 : 0.92 : 0.75 : 1.15.

Pronotum (Fig. 4) generally similar to that of *C. gibbosa*, width across tips of posterolateral spines divided by width of head including eyes in male 2.58–2.97, mean 2.73 (n=13), in female 2.73–3.12, mean 2.97 (n=16). Metathoracic peritreme with dorsal ridge about as high as wide, entire. Scutellum strongly convex. Anterior and intermediate femora each with a single, small, subapical spine beneath, posterior femur with spines arranged as in *C. gibbosa*. Posterior tibia slightly curved at base, about three-quarters as long as posterior femur.

Abdominal sterna with posterolateral angles (Fig. 11) slightly prominent. Male genital capsule with lip broad, filling posterior emargination, tongue apically trifid. Paramere (Fig. 17) with blade narrow. Phallosome consisting of a broad, ventral sclerite produced upwards posterolaterally and two narrow, parallel, longitudinal, dorsal sclerites. Conjunctiva (Fig. 18) with dorsomedian lobe low, flat-topped, bearing a pair of small, membranous appendages at its dorsolateral angles; intermediate dorsal lobe membranous, conical; distal dorsomedian lobe obsolete; distal dorsolateral lobes membranous,



**Figs 14–21** *Clavigralla* species. (14) *gibbosa*, dorsomedial view of left paramere; (15) *orientalis orientalis*, same; (16) *orientalis serica* (holotype), same; (17) *scutellaris*, same; (18) *scutellaris*, left lateral view of conjunctiva and vesica; (19) *gibbosa*, entire aedeagus in dorsal view; (20 & 21) *gibbosa*, right lateral and ventral views of phallosome, conjunctiva and vesica. Dotted lines in Fig. 19 show outline of wings of ejaculatory reservoir complex seen by transparency; dotted lines in Fig. 20 show outline of entire complex seen by transparency. Stipple indicates sclerotized areas.

about twice as long as wide; posterior face of conjunctiva above vesica with a pair of membranous, T-shaped lobes; distal ventrolateral lobes large, lightly sclerotized; ventral lobes rather small, membranous. Ejaculatory reservoir complex symmetrical, wings and straps long. Sclerites protecting base of vesica paired, symmetrical. Female abdominal sternite VII divided for slightly less than half its length. Ovipositor similar to that of *C. gibbosa*. Spermatheca (Fig. 25) with bulb narrow, duct about twice as long as bulb and slightly sinuous.

Sculpture of integument as in *C. gibbosa* except for disc of pronotum which is granulate-punctate with a few of the larger granules on the declivent area projecting through the tomentum.

Distribution and colour of the various types of pubescence as in *C. gibbosa* except that the decumbent pubescence is always silvery white, never with yellowish or golden tinge and junction of areas of pale and

dark pubescence on pronotum follows a weakly undulating line and tufts of brown hairs are absent from this region.

Coloration generally as in *C. gibbosa* but head usually with some dorsal markings piceous and femora and tibiae with incomplete piceous annuli at junctions of reddish brown areas with stramineous areas, tibiae also occasionally with incomplete brown or piceous median annuli. Clavus and corium buff, suffused with pink especially in apical part of corium, granules of basal veins piceous, punctures often brown. Membrane lightly infusate except for a narrow, colourless or milky band against apical margin of corium. Laterotergites pinkish brown, concolorous or with a small, transversely oval, stramineous spot or band in anterior half of some or all of them.

REMARKS. This species may readily be separated from *C. gibbosa* and *C. orientalis* by the weakly undulating junction between the areas of light and dark pubescence on the pronotum. It is very closely related to *C. tomentosicollis* Stål, a common and widespread pest of pulse crops in the Ethiopian region, and the ranges of the two species are almost contiguous in Africa.

DISTRIBUTION. Occupies a crescent-shaped area from Kenya and Sudan through Arabia and Pakistan to India. This distribution may in part result from human introduction. The specimen listed below from Pakistan is from an area generally regarded as being in the Palaearctic region.

MATERIAL EXAMINED. *Coreus scutellaris* Westwood, lectotype ♂, INDIA: Gogo (UM, Oxford). *Acanthomia breviostris* Stål, lectotype ♀, SUDAN: Chartum [=Khartoum] (*Schauf*) (NR, Stockholm).

KENYA: 1 ♂, Northern Frontier District, Wajir, 25.i.1955 (*I. Lansbury*); 1 ♂, S. Nyeri, vi.1949 (*van Someren*); 1 ♀, Lukenia, iii.1937 (*van Someren*). SUDAN: 1 ♂, [no locality cited,] 16.iii.1926 (*G. R. F. Medani & F. G. S. Whitfield*); 2 ♀, Berber Prov., Lulua, 1908 (*H. H. King*); 3 ♂, 1 ♀, Ed Damer, 5–10.vii.1961 (*R. Linnavuori*). SOUTHERN YEMEN: 3 ♂, 3 ♀, El Kod, xii.1957, on *Dolichos lablab* (*R. C. M. Darling*); 1 ♀, Wadi Dareija, SW. of Dhala, c. 1400 m, 6–9.xi.1937 (*H. Scott & E. B. Britton*). MUSCAT AND OMAN: 1 ♀, Oman, Al Wafi, 18.iii.1976 (*K. Guichard*). PAKISTAN: 1 ♂, Hangu, 13.x.1963, in flight (*M. N. Zaman*). INDIA: 1 ♂, Andhra Pradesh, Hyderabad, 28.x–4.xi.1971 (*A. C. Pont & J. C. Deeming*); 1 ♀, 1 V instar nymph, Maharashtra, Bombay (*Dixon*); 1 ♂, 1 ♀, Madras, Coimbatore, 3.vii.1914, reared on Red Gram (*Cajanus cajan*) (*Ramakrishna*); 1 ♀, Kerala, Thekkadi, Periyar Dam, 6–10.v.1937 (*BM–CM Expedition*); 1 ♀, 'Trev.' [=Kerala, Trivandrum], vi.1901; 3 ♂, 6 ♀, Mysore, Chickballapur, ii, iii and vi.1915 (*T. V. Campbell*). (All in BMNH, London.) AFGHANISTAN: 1 ♀, Nengrahar Prov., banks of Kabul River and desert, 580 m, 27.v.1969 (*D. Povolný*) (Moravské Museum, Brno, Czechoslovakia).

### *CLAVIGRALLOIDES* gen. n.

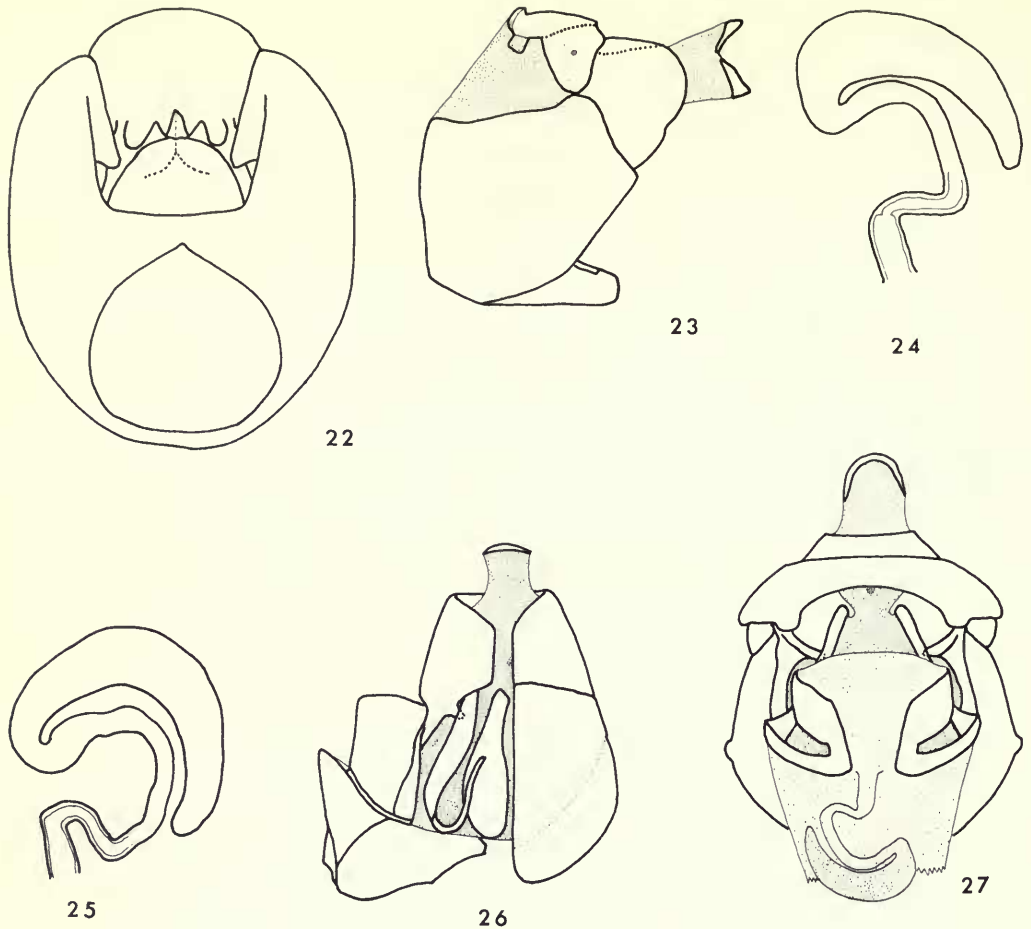
Type-species: *Lygaeus acantharis* Fabricius, 1803.

Form oblong, rather robust, not depressed, connexivum broadest in middle, aspect spinose.

Head between one-half and two-thirds length of pronotum, granulate. Antennifers parallel or slightly divergent, process at outer apical angle either very short or long and narrow, not touching maxillary plate. Antennae with segment I the longest, about one and a half times as long as width of head including eyes, of uniform width from near base to apex, weakly granulate; segment II longer than III, both very weakly granulate and more slender than I; segment IV elongate fusiform, sensory area occupying about 93 per cent of its length. Rostrum reaching disc of metasternum, segment I the longest, II and IV slightly shorter than I, subequal, III slightly longer than half length of I. Bucculae occupying about one-quarter to one-third of length of ventral midline of head.

Pronotum strongly declivent, posterolateral angles produced, each bearing a strong spine, posterior margin in front of scutellum straight, prescutellar angles each marked by a short spine, disc always bearing four short, stout spines, the anterior pair larger and more widely spaced than the posterior pair, lateral margins, posterolateral margins and anterior part of disc strongly granulate, disc posteriorly punctate. Scutellum longer than wide, convex, apex very slightly produced, pointed. Mesosternum and metasternum broadly sulcate in midline. Metapleural scent-gland orifice with dorsal ridge of peritreme bilobed, posterior lobe much smaller than anterior, or very rarely entire. Corium with apex slightly produced, reaching suture between laterotergites V and VI when at rest. Wings with antevannal vein well developed. Anterior and intermediate femora each with a single, moderately large, ventral, subapical spine, occasionally with a very small spine distal to this. Posterior femora with two major spines in the subapical





**Figs 22-27** *Clavigralla* species. (22) *gibbosa*, dorsal view of genital capsule with parameres removed; (23) *gibbosa*, left lateral view of structures of ♀ abdominal segments VIII-XI; (24) *gibbosa*, spermatheca; (25) *scutellaris*, same; (26) *gibbosa*, ventral view of structures of ♀ abdominal segments VIII-XI; (27) *gibbosa*, dorsal view of structures of abdominal segments VIII-XI. Fine dotted line across paratergite VIII and valvifer I in Figs 23 and 26 indicates limit of area normally retracted into segment VII; thick dotted lines in Fig. 23 demarcate terga and paratergites of segments VIII and IX. Stipple indicates membrane; sparse stipple in Fig. 27 indicates common oviduct and gynatrial sac.

series, some small or very small spines between them, rarely one very small spine proximal to the first major spine and close to it, and a terminal series of three or four spines.

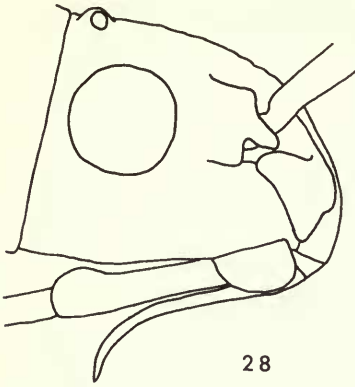
Abdominal sterna III-VII with posterolateral angles produced into spines.

Male genital capsule with lip narrow, apices of parameres visible in posterior view on each side of lip, tongue of capsule long and rather narrow. Phallosome with a large, ventral sclerite extended dorso-laterally and two narrow, parallel, dorsal sclerites. Conjunctiva with two sclerites protecting base of vesica, the left one slightly the larger, otherwise membranous, with narrow dorsomedian lobe, with or without narrow distal dorsomedian lobe, with finger-like distal dorsolateral lobes, small, rounded, apical ventral lobes and large, multifid distal ventrolateral lobes. Ejaculatory reservoir complex with straps minute, rudimentary, wings penetrating bases of distal dorsolateral lobes for a short distance.

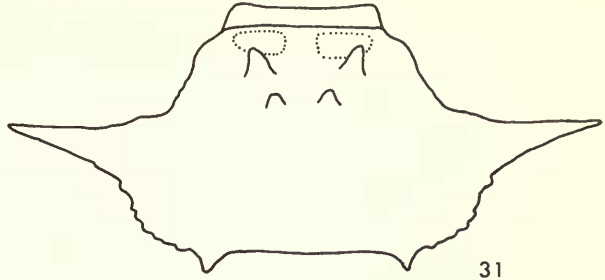
Spermatheca with bulb narrowly lunate, duct less than twice as long as bulb and attached terminally or subterminally to it. Second valvula of ovipositor internally with a ventrodistally projecting, setose, membranous lobe. Sclerites of anterior wall of gynatrium with three short arms. Female tergum IX in same plane as rest of abdominal tergites, anus directed posteriad.

REMARKS. Differs from other genera of Clavigrallini in the characteristic arrangement of spines on the disc of the pronotum. Because both primitive and derived forms of antennifer process and metathoracic peritreme occur, the genus appears to be of comparable age to the tribe.

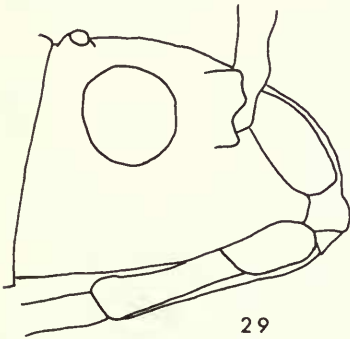
DISTRIBUTION. Northern India and southern China south-eastwards to New Guinea and northern Australia.



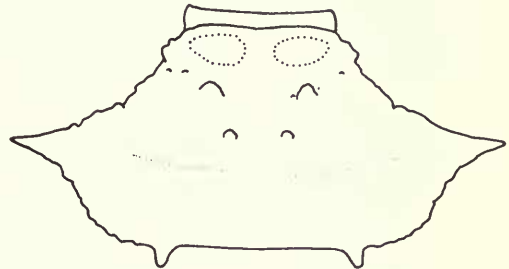
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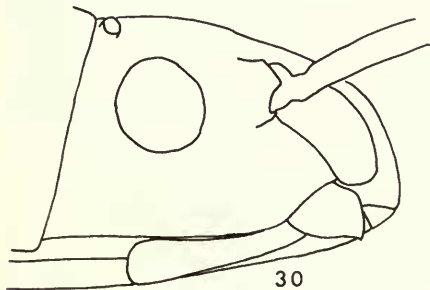
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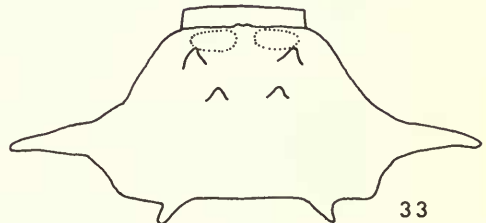
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**Figs 28–33** *Clavigrallus* species. (28) *acantharis*, right lateral view of head; (29) *tuberosus tuberosus*, same; (30) *enkidu* (holotype), same; (31) *acantharis*, dorsal view of pronotum; (32) *tuberosus tuberosus*, same; (33) *enkidu* (holotype), same.

## Key to species

- 1 Process at outer angle of antennifer short (Figs 29, 30) . . . . . 2
- Process at outer angle of antennifer long, narrow (Fig. 28) . . . . . 4
- 2 Metathoracic peritreme with dorsal ridge entire (Fig. 38). Pronotum with white, decumbent pubescence throughout. (New Guinea) . . . . . *C. enkidu* sp. n. (p. 300)
- Metathoracic peritreme with dorsal ridge bilobed (as in Fig. 37). Pronotum with pubescence white anteriorly, brown posteriorly. (S. China, N. India) (*C. tuberosus* Hsiao) . . . . . 3
- 3 Pronotum with posterolateral angles directed laterally (Fig. 32). (S. China) . . . . . *C. tuberosus tuberosus* (Hsiao) (p. 303)
- Pronotum with posterolateral angles directed anterolaterally (Fig. 34). (N. India) . . . . . *C. tuberosus indicus* subsp. n. (p. 303)
- 4 Pronotum with posterolateral spines short (Fig. 35). (Lombok, Timor, Tukang Besi Islands) . . . . . *C. quadrituberculatus* (Breddin) (p. 300)
- Pronotum with posterolateral spines longer (Figs 31, 36) . . . . . 5
- 5 Paramere with blade narrow (Figs 44–46). Abdomen with marginal spines narrower (Fig. 39). (China, SE. Asia to Australia) . . . . . *C. acantharis* (Fabricius) (p. 296)
- Paramere with blade broad (Figs 47, 48). Abdomen with marginal spines broader (Fig. 40). (New Guinea, Australia) . . . . . *C. spinosus* sp. n. (p. 297)

## Descriptions of species

### *Clavigralloides acantharis* (Fabricius) comb. n.

(Figs 28, 31, 37, 39, 44–46, 53, 55, 58, 61, 62)

*Lygaeus acantharis* Fabricius, 1803 : 206. LECTOTYPE ♂, CHINA (UZM, Copenhagen), here designated [examined].

*Clavigralla tuberculata* Dallas, 1852 : 513. Holotype, HONG KONG (BMNH, London) [examined]. [Synonymized by Distant, 1901 : 426.]

*Clavigralla acantharis* (Fabricius) Stål, 1868 : 67.

*Clavigralla spinigera* Walker, 1872 : 6. Holotype ♂, WEST MALAYSIA (BMNH, London) [examined].  
Syn. n.

Length: ♂, 8.3–9.9 mm, mean 9.2 mm (n=18); ♀, 8.8–10.4 mm, mean 9.8 mm (n=29).

Ratio of lengths of antennal segments I : II : III : IV about 1.00 : 0.85 : 0.77 : 0.81. (In eight specimens from China, included in these figures, the average ratio is 1.00 : 0.82 : 0.74 : 0.81). Length of segment I divided by width of head including eyes 1.41–1.86, mean 1.61 (n=48). Bucculae rounded, occupying between one-quarter and one-third length of ventral midline of head. Ratio of lengths of rostral segments I : II : III : IV about 1.00 : 0.93 : 0.54 : 0.91, but length of IV variable, sometimes longer than II. Antennifers slightly divergent, outer apical angle of each bearing a narrow, obliquely deflexed process (Fig. 28). Pronotum (Fig. 31) with posterolateral spines directed laterally or slightly anterolaterally, width across tips of spines divided by width of head including eyes 3.00–3.37, mean 3.31 (n=42), area of disc bearing the four spines distinctly convex. Metathoracic scent-gland peritreme with anterior and posterior lobes of dorsal ridge distinct (Fig. 37). Abdominal sternites III–VII with posterolateral angles produced into rather long spines (Fig. 39). Male genital capsule apically notched or sometimes entire. Paramere (Figs 44–46) rather slender, with shaft tapering slightly towards base, apical margin with or without a slight notch. Conjunctiva (Fig. 53) without prominent distal dorsomedian lobe, distal dorsolateral lobes joined dorsally by a low fold. Female second valvulae (Fig. 55) oblong, bilobed apically, upper lobe sclerotized and glabrous, lower lobe membranous and setose. Sclerites of anterior wall of gynatrium as in Figs 61 and 62. Spermatheca (Fig. 58) with duct attached terminally to bulb.

Thoracic pleura granulate-punctate, sterna with reticulate sculpture; femora very weakly granulate; clavus with three rows of punctures, corium seriatly punctate, more deeply so anteriorly, main veins of corium granulate basally. Abdominal terga I and II transversely rastrate, III–VI punctate, the punctures very large and occasionally confluent on anterior tergites, becoming much smaller and more remote posteriorly; abdominal sterna and laterotergites weakly granulate.

Head and antennae with short, semi-erect pubescence, head and antennal segment I with decumbent, white, tomentose pubescence. Pronotum, scutellum and thoracic pleura with both types of pubescence throughout, the white, decumbent type particularly dense in three longitudinal lines on pronotum, along midline and sides of scutellum and in several oblique lines on pleura; thoracic sterna with decumbent, tomentose pubescence only. Legs with long, erect and shorter, semierect hairs, femora also with patches of sparse, decumbent, white pubescence. Clavus and corium with uniform, rather short, semidecumbent pale



brown pubescence. Abdominal sterna with longer and shorter semierect hairs and numerous small patches of white, decumbent pubescence, these patches confluent and more dense towards sides of sternites II and III. Laterotergites with decumbent, white pubescence and short, semidecumbent pubescence.

Colour generally reddish brown, spines of pronotum, of femora and of abdominal sternites piceous; clavus, corium, antennae, tibiae, tarsi and basal half of femora stramineous; hemelytral membrane with veins brown; apex of scutellum, a large patch in middle of laterotergites VI and VII, much of female genitalia and two rows of oblique stripes on each side of abdominal sternites III–VII pale yellow.

REMARKS. There is some variation between populations in respect of the relative lengths of the antennal segments and in the male genitalia, which in some populations or individuals display a small apical notch in both the posterior border of the lip of the genital capsule and the apical margins of the parameres. There is also slight variation in the width of the blade of the paramere. These differences do not seem sufficiently marked to justify delineation of subspecies. The species is characterized by the long, narrow process of the antennifer and the long abdominal spines.

DISTRIBUTION. This species is found throughout almost the whole range of the genus, from southern China, through the mainland and islands of south-east Asia to New Guinea and the extreme north of Australia.

MATERIAL EXAMINED. *Lygaeus acantharis* Fabricius, lectotype ♂, CHINA (*Pflug*) (Fabricius's collection, now at UZM, Copenhagen). *Clavigralla tuberculata* Dallas, holotype [abdomen missing, probably ♀], HONG KONG (BMNH, London). *Clavigralla spinigera* Walker, holotype ♂, WEST MALAYSIA: Penang (*Bowring*) (BMNH, London).

CHINA: 1 ♂, Foochow, 1937–1938 (*M. S. Yang*) (BMNH, London); 1 ♀, Fukien, Chung An, Bohea Hills, 24.vi.1939 (*T. C. Maa*); 1 ♀, Bohea Hills, 4.vii.1939 (*Maa*); 1 ♂, Bohea Hills, 25.ix.1939 (*Maa*); 1 ♀, Fukien, Shaowu, Ta Chu Lan, ix.1939 (*Maa*); 1 ♀, Shaowu, Shui Pei Kai, vii.1942 (*Maa*) (all in BPBM, Honolulu). LAOS: 1 ♂, 1 ♀, Khammouane Province, Phon Tiou, 11.ix.1965 (*native collector*); 1 ♂, Borikham Province, Pakkading, 15–31.viii.1965 (*native collector*) (both in BPBM, Honolulu). VIETNAM: 1 ♀, Karyu Dinar, 200 m, 13–28.ii.1961 (*N. R. Spencer*) (BPBM, Honolulu). THAILAND: 1 ♀ (*Saunders*) (BMNH, London). BURMA: 1 ♂, Mishmi Hills, Dingliang, 2450 ft (750 m), 13.iii.1935 (*M. Steele*); 1 ♀, Carin Chebâ, 900–1100 m, 5.xii.1888 (*L. Fea*) (both in BMNH, London). PHILIPPINES: 3 ♀, Luzon, Ripang, 1500 ft (460 m) (*G. Böttcher*); 2 ♀, L., Gabugao, 1550 ft (475 m) (*Böttcher*); 1 ♂, L., Cretas Novi (*W. Schulze*) (all in BMNH, London); 1 ♂, L., Rizal, Montalban, Wa-wa Dam, 150–200 m, 24.iii.1965 (*L. M. Torrevillas*) (BPBM, Honolulu); 1 ♂, Mindanao, Zamboanga (*Böttcher*) (BMNH, London); 1 ♂, M., Agusan, S. Francisco, 10 km SE., 13.xi.1959 (*L. W. Quate*) (BPBM, Honolulu); 1 ♀, Palawan, Brooke's Point, Macagua, 75 m, 27–31.iii.1962 (*H. Holtmann*) (BPBM, Honolulu). BORNEO: 1 ♀, Brunei, Sinaut, 24.xi.1969 (*M. Smart*) (BMNH, London); 1 ♂, 1 ♀, Sarawak, Nanga Pelagus, nr Kapit, 180–585 m, 7–14.viii.1958, secondary forest (*T. C. Maa*) (BPBM, Honolulu). SUMATRA: 1 ♂, Serdang tet, Tobameer (*Dr B. Hagen*) (RNH, Leiden); 1 ♂, Soekaranda, i.1894 (*Dohrn*) (IZPAN, Warsaw). JAVA: 1 ♂ (*Kalshoven*); 2 ♀, Samarang, vii.1909 and ix.1909 (*E. Jacobson*) (all in RNH, Leiden). NEW GUINEA: 1 ♀, Irian Barat, Wamena, 700 m, 10–25.ii.1960 (*T. C. Maa*); 1 ♂, I.B., Genjam, 40 km W. of Hollandia, 100–200 m, 1–10.iii.1960 (*Maa*) (both in BPBM, Honolulu); 2 ♀, Papua New Guinea, Wau, Morobe District, 1200 m, 29–30.ix.1963, at m. v. light-trap (*J. Sedlacek*); 1 ♂, P. N. G., Central District, Sogeri, 600 m, 27.x–8.xi.1968 (*Tawi, Mena*) (all in BPBM, Honolulu); 1 ♂, 1 ♀, P. N. G., Western District, Oriomo Agricultural Station, 13.x.1960, on *Pueraria phaseoloides* (*J. J. H. Szent-Ivany*) (BMNH, London). BISMARCK ARCHIPELAGO: 2 ♂, 4 ♀, New Britain, Gazelle Peninsula, Bainings, St Paul's, 350 m, 4–7.ix.1955 (*J. L. Gressitt*) (BPBM, Honolulu). AUSTRALIA: 1 ♂, Northern Territory, Darwin, Mitchell Street, Mrs Eddy's garden, 6.i.1961 (*G. F. Gross*) (SAM, Adelaide).

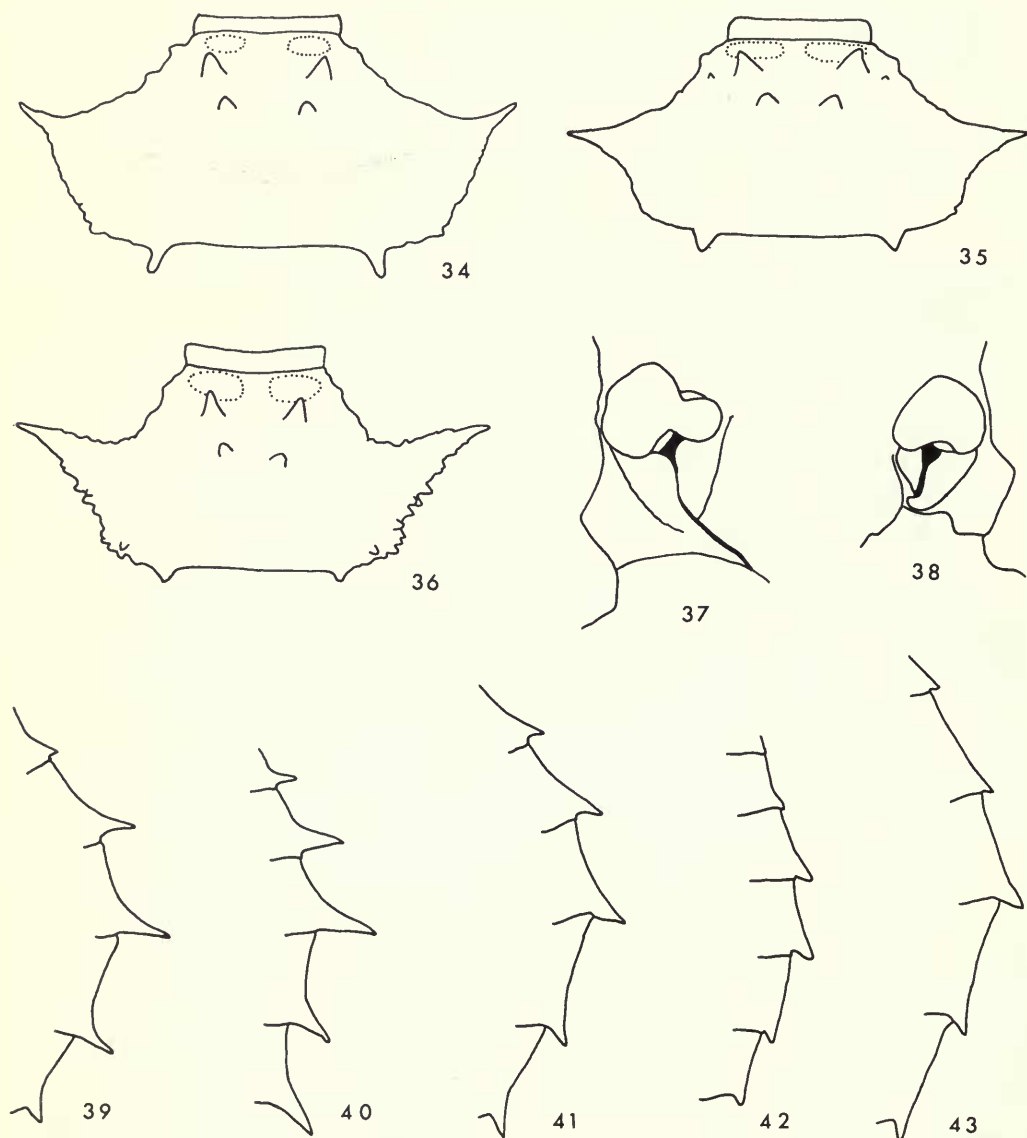
### *Clavigralloides spinosus* sp. n.

(Figs 36, 40, 47, 48)

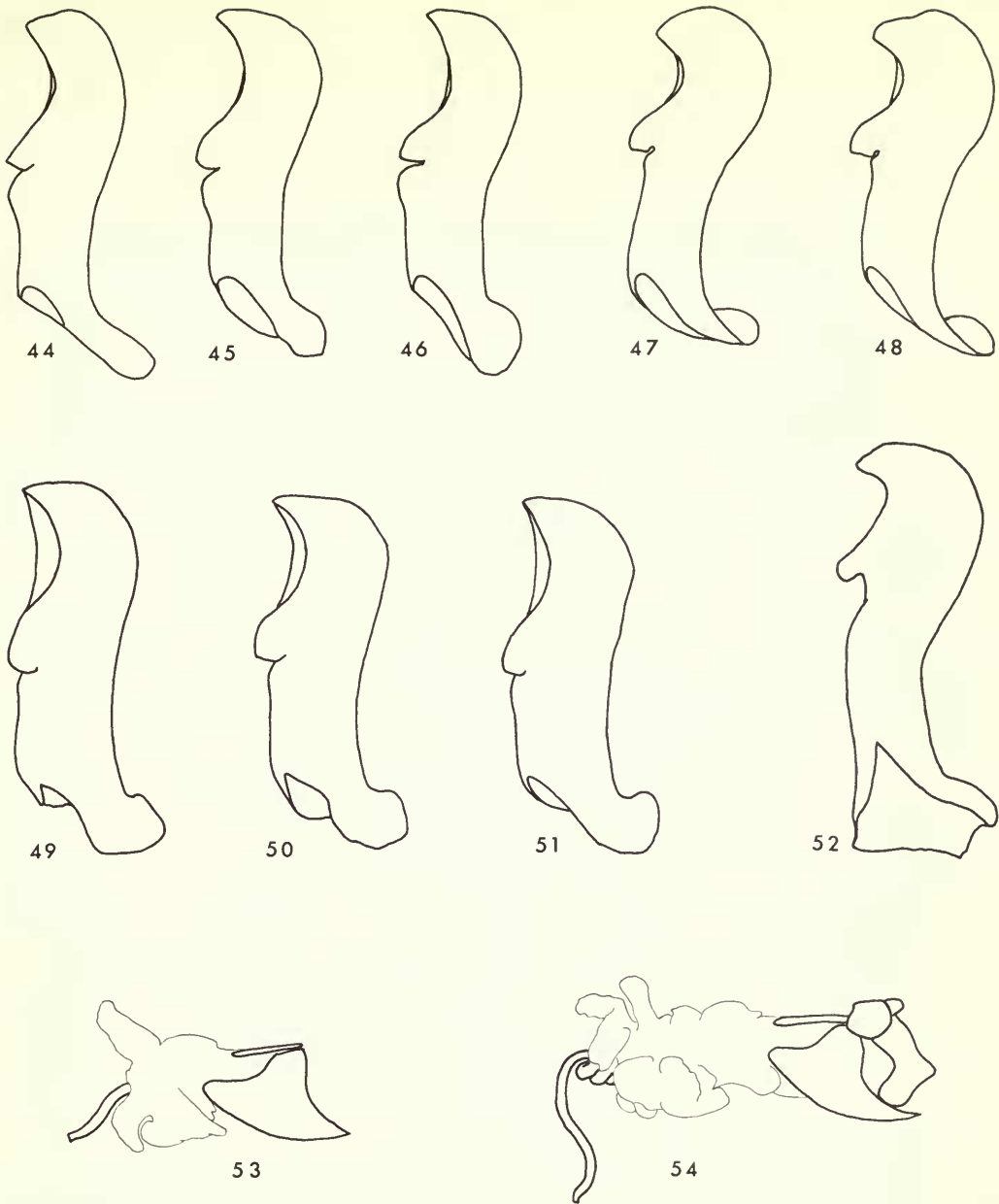
Length: ♂, 8.8–10.0 mm, mean 9.3 mm (n=5); ♀ unknown.

Similar to *C. acantharis* except as noted here. Ratio of lengths of antennal segments I : II : III : IV about 1.00 : 0.87 : 0.77 : 0.68 in examples from New Guinea, 1.00 : 0.93 : 0.85 : 0.72 in examples

from Australia. Length of segment I divided by width of head including eyes 1.50–1.86, mean 1.75 (n=5), shortest in Australian examples. Ratio of lengths of rostral segments I : II : III : IV about 1.00 : 0.94 : 0.54 : 0.91. Antennifers as in *C. acantharis*. Pronotum (Fig. 36) with posterolateral spines directed obliquely forwards in Australian and in three New Guinean examples, directed laterally in the fourth New Guinea example, width across tips of posterolateral spines divided by width of head including eyes 2.86–3.26, mean 3.08 (n=5). Metathoracic peritreme with dorsal ridge less strongly bilobed than in *C. acantharis*. Abdominal sternites III–VII (Fig. 40) produced posterolaterally into spines stouter than those of *C. acantharis*. Male genitalia as in *C. acantharis* except for paramere (Figs 47, 48), in which the blade is much broader and more strongly curved, with or without apical notch.



**Figs 34–43** *Clavigralloides* species. (34) *tuberosus indicus*, dorsal view of pronotum; (35) *quadrituberculatus* (lectotype), same; (36) *spinosus*, same; (37) *acantharis*, lateral view of left metathoracic peritreme; (38) *enkidu* (holotype), lateral view of right metathoracic peritreme; (39) *acantharis*, ventral view of left margin of abdomen; (40) *spinosus*, same; (41) *quadrituberculatus* (lectotype), same; (42) *enkidu* (holotype), same; (43) *tuberosus tuberosus*, same.



**Figs 44–54** *Clavigralloides* species. (44) *acantharis* (China), dorsomedial view of left paramere; (45) same (Philippines: S. Mindanao); (46) same (New Guinea); (47) *spinosus* (New Guinea), same; (48) same (Australia); (49) *quadrituberculatus* (lectotype), same; (50) same (Tukang Besi Is); (51) same (Timor); (52) *tuberosus tuberosus*, same; (53) *acantharis*, right lateral view of phallosome, conjunctiva and vesica; (54) *tuberosus tuberosus*, right lateral view of entire aedeagus.

Sculpture of integument as in *C. acantharis* except that granulation of pronotum posteriorly is much more pronounced. Pilosity distributed as in *C. acantharis* but tomentose pubescence less dense, forming a distinct pale line only along midline of scutellum and, less distinctly, along midline of pronotum; large, pale patches of pubescence on pleura and abdominal sterna II and III ill-defined. Colour dark red-brown, with paler areas in the same positions as in *C. acantharis* but these areas pale red-brown, not contrasting strongly with darker areas.



REMARKS. This species is apparently closely related to *C. acantharis*, differing most in the shape of the male paramere. It may be recognized by the long, narrow process of the antennifer and the long, stout abdominal spines.

DISTRIBUTION. A rarely encountered species, known only from New Guinea (Papua) and Australia (Queensland).

MATERIAL EXAMINED. Holotype ♂, NEW GUINEA: Papua New Guinea, Dogura, 7.x.1955 (*E. L. Cassidy*) (BPBM, Honolulu).

Paratypes. NEW GUINEA: 3 ♂, Papua New Guinea, Dogura, 23.ix.1955, 1.x.1955 and 7.x.1955 (*Cassidy*) (BPBM, Honolulu and BMNH, London). AUSTRALIA: 1 ♂, Queensland, 32–40 km N. of Cookstown, 27.i.1964 (*J. Sedlacek*) (BPBM, Honolulu); 1 ♂, Q., West Normanby R., 40 miles W. of Cookstown, 12.xi.1965 (*G. Monteith*) (UQ, Brisbane).

*Clavigralloides quadrituberculatus* (Breddin) sp. rev., comb. n.

(Figs 35, 41, 49–51, 57, 59, 63, 64)

*Clavigralla quadrituberculata* Breddin, 1899 : 171. LECTOTYPE ♂, LOMBOK (IP, Eberswalde), here designated [examined].

[*Clavigralla acantharis* (Fabricius); Bergroth, 1913 : 155. *Clavigralla quadrituberculata* Breddin incorrectly synonymized with *Clavigralla acantharis* (Fabricius).]

Length: ♂, 8.8–10.3 mm, mean 9.75 mm ( $n=39$ ); ♀, 9.7–10.8 mm, mean 10.3 mm ( $n=61$ ).

Similar to *C. acantharis* but more robust. Ratio of lengths of antennal segments I : II : III : IV about 1.00 : 0.87 : 0.80 : 0.75. Length of segment I divided by width of head including eyes 1.37–1.57, mean 1.46 ( $n=10$ ). Antennifers as in *C. acantharis*. Ratio of lengths of rostral segments I : II : III : IV about 1.00 : 0.94 : 0.55 : 0.91. Pronotum (Fig. 35) with posterolateral spines directed laterally, much shorter than those of *C. acantharis* but pronotum itself more robust, so that width across tips of spines divided by width of head including eyes is only slightly less at 2.83–3.18, mean 2.99 ( $n=10$ ). Metathoracic scent gland peritreme with dorsal ridge strongly bilobed. Abdominal sternites III–VII with posterolateral angles produced into short spines (Fig. 41). Male genitalia similar to those of *C. acantharis* except for parameres (Figs 49–51) which are slightly broader with the shafts not tapering basally. Female with second valvula (Fig. 57) and spermatheca (Fig. 59) very similar to those of *C. acantharis* but sclerites of anterior wall of gynatrium (Figs 63, 64) with posterior arm twisted.

Sculpture of integument as in *C. acantharis*. Distribution of pubescence also as in that species but decumbent, white pubescence more uniform, conspicuously denser only on midline of scutellum. Colour pattern as in *C. acantharis* but with less contrast between pale and dark areas, the overall effect of colour and pubescence combined being noticeably more drab.

REMARKS. This species is distinguished from other species of the genus by the narrow antennifer process and short abdominal spines. It is closely related to *C. acantharis*.

DISTRIBUTION. Lesser Sunda Islands between Wallace's and Weber's lines.

MATERIAL EXAMINED. *Clavigralla quadrituberculata* Breddin, lectotype ♂, LOMBOK: Sapik, 2000 ft (610 m), v–vi.1896 (*H. Fruhstorfer*) (IP, Eberswalde).

TUKANG BESI ISLANDS: 1 ♂, Binongka I., 7–10.iv.1930 (*Snellius Expedition*) (RNH, Leiden). TIMOR: 33 ♂, 46 ♀, 1 ex. without abdomen, Soeai, iv.1929 (*É. le Moult*); 3 ♂, 8 ♀, Soeai, vi.1929 (*le Moult*); 1 ♂, 8 ♀, 1 ex. without abdomen, Soeai, no date (*le Moult*) (RNH, Leiden and BMNH, London).

*Clavigralloides enkidu* sp. n.

(Figs 30, 33, 38, 42)

Length: ♀, 8.75 mm ( $n=1$ ); ♂ unknown.

Similar in build to *C. acantharis* but smaller and darker. Head about three-quarters length of pronotum, its median length almost equal to its width including eyes and thus relatively longer than in other species of the genus. Ratio of lengths of antennal segments I : II : III : IV as 1.00 : 0.98 : 0.93 : 0.67. Length of segment I only 1.26 times width of head including eyes. Antennifers slightly divergent, outer apical angle bearing only a short, porrect, triangular process (Fig. 30). Ratio of lengths of rostral segments I : II : III : IV as 1.00 : 0.93 : 0.53 : 0.83. Bucculae (Fig. 30) acutely angulate anteriorly. Pronotum

(Fig. 33) with posterolateral spines directed laterally with slight curvature posterolaterally. Metathoracic scent-gland peritreme (Fig. 38) with dorsal ridge entire. Abdominal sternites III–VII with posterolateral angles produced into short, triangular spines (Fig. 42). Genitalia not dissected.

Sculpture of integument differs from that of *C. acantharis* in less distinct granulation of dorsal surface of head and obsolescent puncturation of corium. Distribution of types of pubescence as in *C. acantharis*; pale rows of dense, white, decumbent pubescence particularly conspicuous on midline and sides of scutellum, less so on pronotum. Semidecumbent pubescence of corium denser than in *C. acantharis*, these hairs and those of clavus silvery, crisped and flattened. Head pale brown, slightly darker near ocelli, piceous beneath, antennae stramineous with minute, granular hair-bases brown. Pronotum dark brown, scutellum and thoracic pleura mid-brown, thoracic sterna piceous. Legs stramineous, anterior and intermediate femora with a sprinkling of small, piceous spots; posterior femora with a few spots in basal half piceous, posterior face of apical half almost entirely piceous, dorsal side and anterior face pale brown with stramineous patches and small, piceous spots. Anterior and intermediate tibiae each with a short, dorsal streak at base, a penannular mark near base and a few hair-bases at midpoint of its length piceous, posterior tibia with penannular marks at and near base, at middle and near apex piceous. Clavus mid-brown; corium mid-brown darkening apically to piceous, with an arc running from a point three-quarters of the way along costal margin to a point half-way along apical margin and thence along apical margin to its junction with clavus white. Membrane infumate, veins darker brown. Abdominal sternites largely stramineous, sternites II and III piceous close to posterior coxae, IV, V and VI each with a patch of small, piceous spots about half-way between midline and lateral margin, posterolateral angles of IV–VII with extreme apices brown. Laterotergites III–V piceous, a small spot on lateral margin of each near anterior margin stramineous, VI piceous with a broad, oblique band stramineous, VII stramineous with anterior margin piceous, genital segments stramineous; terga piceous, VI and VII with obscure paler markings.

**REMARKS.** This species is unique in the genus in both the angulate bucculae and the entire dorsal ridge of the metathoracic peritreme. The colour pattern is striking, the white mark at the apex of each corium standing out in sharp contrast to the dark background. The slightly retrorse curvature of the pronotal posterolateral spines is not found in any other species of the genus. The very short external process of the antennifer suggests a relationship with *C. tuberosus*, but the patterns of pubescence, especially on the pronotum, differ widely.

**DISTRIBUTION.** Known only from the type-locality in New Guinea (Papua).

**MATERIAL EXAMINED.** Holotype ♀, NEW GUINEA: Papua New Guinea, Vanapa River, 29.ii.1964 (*J. Sedlacek*) (BPBM, Honolulu).

### ***Clavigralloides tuberosus* (Hsiao) comb. n.**

(Figs 29, 32, 34, 43, 52, 54, 56, 60, 65, 66)

*Clavigralla tuberosa* Hsiao, 1964 : 252, 259, fig. 2. Holotype ♂, CHINA: Fukien, 900 m, 10.viii.1960 (Institute of Zoology, Academia Sinica, Peking) [not examined].

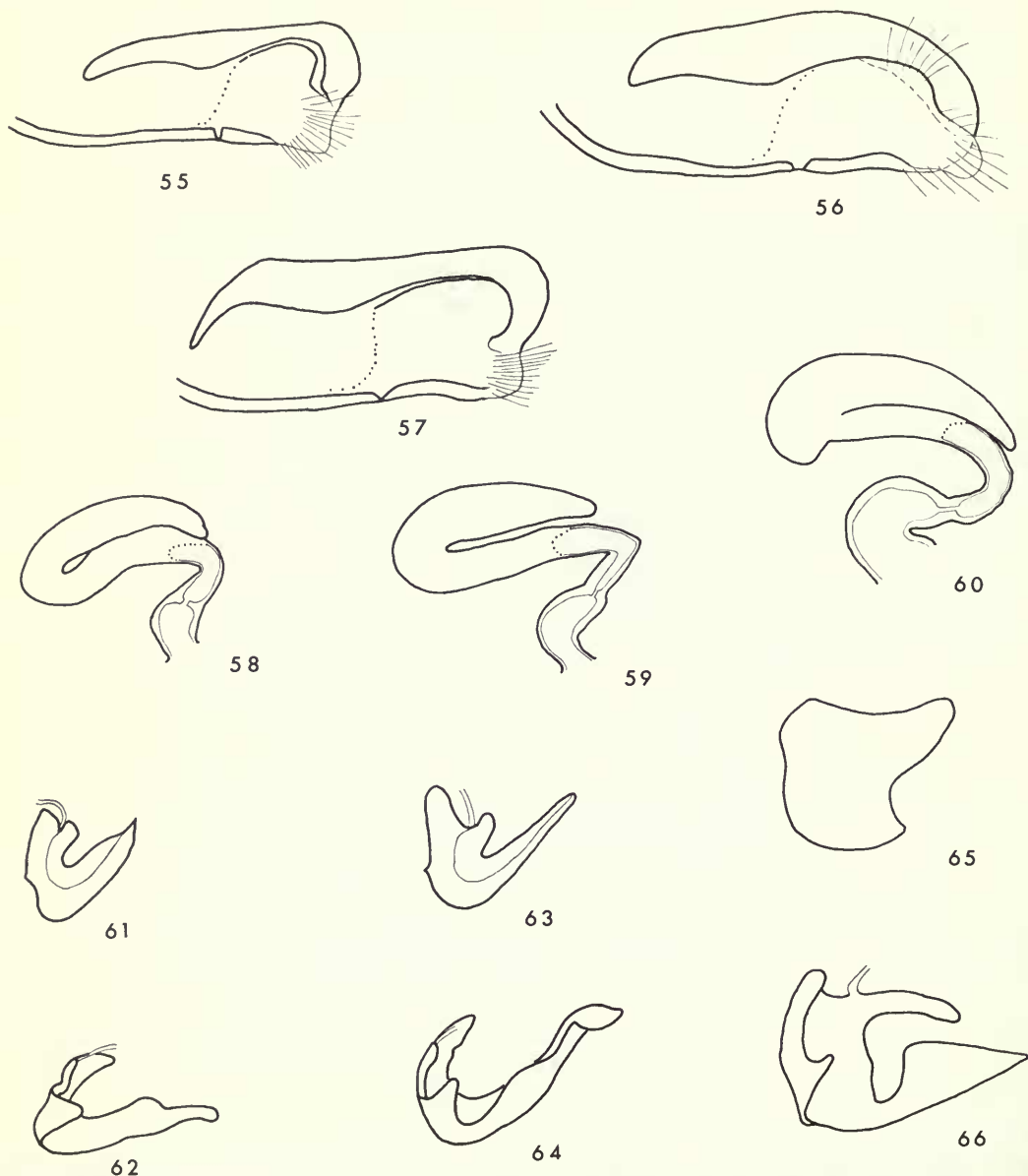
Antennifers parallel, outer apical angle of each with only a short, rounded projection (Fig. 29). Bucculae rounded, occupying less than one-third of ventral midline of head. Ratio of lengths of rostral segments I : II : III : IV about 1.00 : 0.88 : 0.53 : 0.87. Pronotum (Figs 32, 34) rather shallowly declivent, area of disc bearing the four spines weakly convex, spines themselves short, posterolateral spines short, directed laterally or anterolaterally. Metathoracic peritreme with anterior and posterior lobes of dorsal ridge sharply distinct. Abdominal sternites III–VII with posterolateral angles produced into short, triangular spines (Fig. 43). Male genital capsule with lip entire, parameres (Fig. 52) with blade broad. Conjunctiva (Fig. 54) with distal dorsomedian lobe. Female second valvula (Fig. 56) with lower, membranous lobe narrowly produced. Spermatheca (Fig. 60) with duct attached subterminally to bulb. Sclerites of gynatrial wall (Figs 65, 66) of characteristic shape.

Sculpture of integument as in *C. acantharis*.

Head, antennae and legs with pubescence similar to that of *C. acantharis*. Pronotum, except for the area posterior to a line connecting posterolateral angles, with long, erect, pale brown pubescence and shorter, decumbent, silvery, slightly tomentose pubescence, the latter organized, at least anteriorly, into one to three more or less distinct, narrow, longitudinal lines; posterior band of pronotum with short, erect, dark brown pubescence only, the absence of admixed silvery hairs from this band making it appear darker than rest of pronotum, the pale and dark areas sharply demarcated along an almost straight transverse line. Thoracic pleura and abdominal sterna with erect, colourless pubescence and decumbent,

silvery, tomentose pubescence not organized into patches of varying density, but numerous small, circular areas of abdominal sternites devoid of tomentose pubescence altogether. Thoracic sterna with decumbent, silvery pubescence only. Scutellum with long, erect, dark brown hairs and shorter, silvery, tomentose pubescence. Abdominal laterotergites with short, semidecumbent, silvery hairs and laterally also with a few short, brown, suberect hairs. Clavus and corium with short, decumbent, silvery hairs and short, erect, brown hairs intermingled.

Head pinkish brown with ocellar tubercles, ventral midline and sometimes dorsal midline posteriorly piceous; antennae and rostrum pale brown. Pronotum, scutellum, thoracic pleura, clavus and corium



**Figs 55–66** *Clavigralloides* species. (55) *acantharis*, medial view of right second valvula; (56) *tuberosus tuberosus*, same; (57) *quadrituberculatus*, same; (58) *acantharis*, spermatheca; (59) *quadrituberculatus*, same; (60) *tuberosus tuberosus*, same; (61 & 62) *acantharis*, anterior and lateral views of left sclerite of wall of gynatrium; (63 & 64) *quadrituberculatus*, same; (65 & 66) *tuberosus tuberosus*, same.



pinkish brown; femora reddish brown; tibiae stramineous with basal annuli piceous, median and apical annuli or partial annuli brown, sometimes indistinct. Tarsi stramineous, more or less heavily infuscate apically. Abdominal sternites variously marked with brown, stramineous and piceous streaks and blotches, often heavily suffused pinkish brown. Laterotergites red-brown, lateral margins of IV and V each with a small, stramineous spot about one-third of the way back from anterior margin, lateral margins of VI and VII each with a large, stramineous spot in the middle.

REMARKS. This species may be recognized by the combination of the bilobed dorsal ridge of the metathoracic scent-gland peritreme and the very short external apical process of the antennifer. It is the only species of the genus in which the pubescence of the pronotum is sharply divided into pale anterior and dark posterior areas, as in many species of *Clavigralla*. Two subspecies, differing in the shape of the pronotum and the relative lengths of the antennal segments.

DISTRIBUTION. Southern China and northern India and perhaps also in adjacent mountainous areas.

*Clavigralloides tuberosus tuberosus* (Hsiao)

(Figs 29, 32, 43, 52, 54, 56, 60, 65, 66)

*Clavigralla tuberosa* Hsiao, 1964 : 252, 259, fig. 2.

Length: ♂, 9.3–11.5 mm, mean 10.4 mm (n=39); ♀, 11.2–12.0 mm, mean 11.4 mm (n=17).

Ratio of lengths of antennal segments I : II : III : IV about 1.00 : 0.84 : 0.71 : 0.75. Length of segment I divided by width of head including eyes 1.33–1.56, mean 1.45 (n=13). Pronotum (Fig. 32) with posterolateral angles and spines directed laterally at right angles to longitudinal axis of body, width across tips of posterolateral spines divided by width of head including eyes 2.83–3.38, mean 3.13 (n=13).

REMARKS. A single female from Tibet was seen. It was 10.8 mm long and retained only the first antennal segment. The length of this segment divided by the width of the head was 1.27 and the width of the pronotum divided by the width of the head was 2.59. It may represent a third subspecies and its measurements were therefore not used in drawing up the description of the typical subspecies.

DISTRIBUTION. Southern China. Type-material, which could not be examined, was collected in Fukien, Chekiang, Szechuan and Yunnan (Hsiao, 1964 : 252).

MATERIAL EXAMINED. CHINA: 1 ♀, Tibet (AMNH, New York); 1 ♂, Szechuan, Mt Omei, 16.vii.1932 (*Franck*) (BPBM, Honolulu); 1 ♂, 1 ♀, Szechuan, 2000–2300 m, 9.ix.1963 [det. Hsiao] (BMNH, London); 1 ♂, Yunnan, Yunnan-fou, viii.1932 (*Kao Pei Lan*) (BMNH, London); 1 ♂, Yunnan-fou, San-nen-Kai (*E. le Moult*) (RNH, Leiden); 1 ♂, Fukien, Yen-ping, 23.viii.1917 (AMNH, New York); 1 ♂, Fukien, Kwangtseh City, viii.1945 (*T. Maa*); 1 ♂, Fukien, Kienyang City, v.1945 (*T. C. Maa*); 1 ♂, Fukien, Chungan, Sanchiang, 11.viii.1945 (*Maa*); 1 ♂, 1 ex, without abdomen, Chungan, Upper Kuatun, 1400 m, 2.v.1945 (*Maa*); 1 ♂, Upper Kuatun, 1400 m, x.1942 (*Maa*); 5 ♂, 1 ♀, Kuatun, v.1942 (*Maa*); 27 ♂, 14 ♀, Fukien, Shaowu, Ta Chu Lan, iv–x.1942, 1943, 1945 (*Maa*) (all in BPBM, Honolulu).

*Clavigralloides tuberosus indicus* subsp. n.

(Fig. 34)

Length: ♂, 10.2–10.8 mm, mean 10.4 mm (n=3); ♀, 10.2–10.6 mm, mean 10.4 mm (n=3).

Ratio of lengths of antennal segments I : II : III : IV about 1.00 : 0.84 : 0.73 : 0.81. Length of segment I divided by width of head including eyes 1.27–1.50, mean 1.34 (n=6). Pronotum (Fig. 34) with posterolateral angles directed slightly anteriorly, not as strongly produced as in subsp. *tuberosus*, width of pronotum across tips of posterolateral spines divided by width of head across eyes 2.58–2.82, mean 2.78 (n=6).

DISTRIBUTION. Northern India, at fairly high altitudes.

MATERIAL EXAMINED. Holotype ♂, INDIA: Chakrata (*Atkinson*) (UM, Oxford).

Paratypes. INDIA: 1 ♀, Chakrata (*Atkinson*) (UM, Oxford); 1 ♂, 1 ♀, 'E. Ind.' (*Bacon*) (UM, Oxford); 1 ♂, Assam, Delai Valley, Taphlogam, 10.xi.1936, 6000 ft (2000 m) (*M. Steele*) (BMNH, London); 1 ♀, Uttar Pradesh, Kumaon (*H. G. Champion*) (BMNH, London).



Material excluded from type-series. INDIA: 1 ex. (head and pronotum only), Himachal Pradesh, Katrain, 13.viii.1975, from field crops (*O. P. Lal*) (BMNH, London).

### *GRALLICLAVA* gen. n.

Type-species: *Clavigralla horrens* Dohrn, 1860.

Form oblong, not depressed, connexivum moderately expanded in middle segments, aspect spinose (Fig. 71).

Head approximately two-thirds length of pronotum, granulate. Antennifers moderately divergent, process at outer apical angle of antennifer short, triangular, porrect. Antennae with segment I usually the longest, slightly expanded in apical fifth, less than one and a half times as long as width of head including eyes, granulate, more robust than II and III; segment III shortest of all, II and III minutely granulate; segment IV elongate fusiform, usually slightly shorter than I, sensory portion occupying about 90 per cent of its length. Rostrum reaching nearly to posterior margin of metasternum, segments I and II subequal, IV slightly shorter, III by far the shortest. Bucculae short, semicircular, occupying about one-quarter to one-third of ventral midline of head.

Pronotum strongly declivent, granulate, posterolateral angles elevated, laterally (rarely anterolaterally) produced, terminating in a slender, slightly upcurved spine, pronotum otherwise without spines or tubercles except for prescutellar spines on posterior margin, which is broadly and shallowly sinuate between them. Scutellum rather strongly convex, equilateral, granulate, apex slightly produced. Mesosternum and metasternum sulcate throughout. Metapleural scent-gland peritreme with dorsal ridge broadly reniform, never bilobed. Hemelytra with clavus strongly punctate, corium strongly punctate at base, becoming more weakly punctate towards apex, extreme apex smooth, slightly produced, reaching suture between laterotergites V and VI when at rest. Wings with antevannal vein visible. Anterior and intermediate femora clavate, with or without a small subapical spine beneath; posterior femora abruptly clavate, each with two large, subapical spines beneath with several very small spines between them and an apical series of four spines.

Abdominal sternites III–VII with posterolateral angles produced into spines.

Male genital capsule with lip filling posterior emargination, concealing parameres in posterior view. Phallosome with a short, ventral sclerotization extending posterodorsally along its sides and two short, narrow, parallel dorsal sclerites. Conjunctiva with dorsomedian lobe low, its outer angles prominent; distal dorsomedian lobe membranous, long, narrow, apically bifid; distal dorsolateral lobes long or short, their posterior faces sclerotized throughout; apical ventral lobes small, rounded, membranous; distal ventrolateral lobes long, reflexed, membranous. Ejaculatory reservoir complex with paired wings, straps absent. Conjunctiva with two sclerites protecting base of vesica, the left one about twice as long as the right.

Female with tergum VIII short, IX deflexed so that opening of anus is directed ventrally. Sternum VII not cleft, but with a thickened ridge in midline, probably produced by fusion of sides of cleft. First valvifer short, first valvula quadrangular with apex obliquely truncate, paratergites VIII and IX almost vertical in the transverse plane, facing posteriorly. Second valvula obliquely truncate or bilobed at apex. Spermatheca with bulb narrowly lunate, duct attached terminally to it, not convoluted, short. Sclerites in anterior wall of gynatrium C- or L-shaped, in horizontal plane.

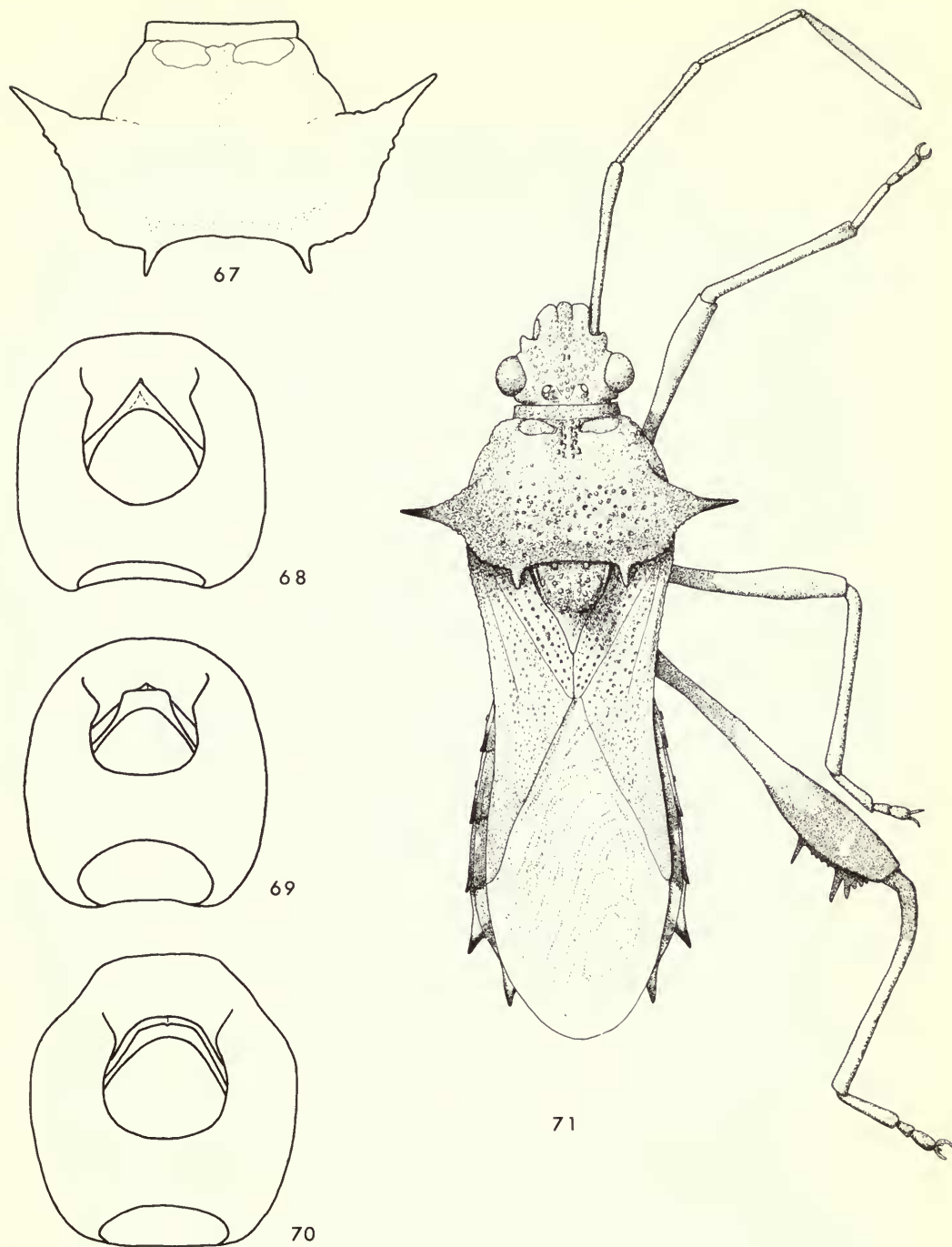
All species are very similar in colour, pubescence and sculpture of the integument. For description see under *G. indica* below. The patches of dense, white, felted hairs on the thoracic pleura and abdominal sterna are characteristic of and unique to the genus.

REMARKS. This genus is very uniform in structure and appearance and is sharply demarcated from the rest of the Pseudophloeinae by the ventrally deflexed anus of the female. Another unique characteristic of the genus is the presence of patches of densely felted hairs on the thoracic pleura and abdominal sterna. There are two well defined groups of species characterized by the form of the male genitalia.

DISTRIBUTION. Sri Lanka, India, southern China, Taiwan south-eastwards to northern Australia and the Solomon Islands.

#### Key to species

|   |                   |    |
|---|-------------------|----|
| 1 | Males . . . . .   | 2  |
| – | Females . . . . . | 12 |



Figs 67–71 *Gralliclava* species. (67) *horrens palawanensis*, dorsal view of pronotum; (68) *indica*, dorsal view of genital capsule with parameres and aedeagus removed; (69) *horrens horrens*, same; (70) *australiensis*, same; (71) *horrens horrens*, dorsal view.

|    |                                                                                                                                                                                                                                                                                                              |                                                   |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| 2  | Genital capsule with tongue truncate (Figs 69, 70) ( <i>horrens</i> -group)                                                                                                                                                                                                                                  | 3                                                 |
| -  | Genital capsule with tongue acutely pointed (Fig. 68) ( <i>indica</i> -group)                                                                                                                                                                                                                                | 6                                                 |
| 3  | Paramere (Fig. 79) strongly angled inwards at apex. (Tropical Australia)                                                                                                                                                                                                                                     |                                                   |
| -  | <i>G. australiensis</i> sp. n. (p. 318)                                                                                                                                                                                                                                                                      | 4                                                 |
| 4  | Paramere (Figs 80, 81) only weakly angled inwards at apex                                                                                                                                                                                                                                                    |                                                   |
| -  | Paramere (Fig. 80) with ventromedian (inner) edge weakly convex in basal two-thirds of its length. (New Guinea and adjacent island groups)                                                                                                                                                                   | <i>G. irianensis</i> sp. n. (p. 316)              |
| -  | Paramere (Fig. 81) with ventromedian (inner) edge moderately convex in basal three-quarters of its length ( <i>G. horrens</i> (Dohrn))                                                                                                                                                                       | 5                                                 |
| 5  | Pronotum (Fig. 71) with posterolateral angles directed laterally. (Widespread in Oriental region)                                                                                                                                                                                                            | <i>G. horrens horrens</i> (Dohrn) (p. 314)        |
| -  | Pronotum (Fig. 67) with posterolateral angles directed anterolaterally. (Philippines: Palawan only)                                                                                                                                                                                                          | <i>G. horrens palawanensis</i> subsp. n. (p. 315) |
| 6  | Paramere (Figs 76-78) with tooth on inner face very prominent                                                                                                                                                                                                                                                | 7                                                 |
| -  | Paramere (Figs 72-75) with tooth on inner face less prominent                                                                                                                                                                                                                                                | 9                                                 |
| 7  | Paramere (Fig. 78) with tooth on inner face narrow. (Vietnam)                                                                                                                                                                                                                                                | <i>G. dissimilis</i> sp. n. (p. 312)              |
| -  | Paramere (Figs 76, 77) with tooth on inner face broadly triangular ( <i>G. montana</i> sp. n.)                                                                                                                                                                                                               | 8                                                 |
| 8  | Paramere (Fig. 76) with apical margin concave. (N. India, Sikkim)                                                                                                                                                                                                                                            |                                                   |
| -  | <i>G. montana montana</i> subsp. n. (p. 311)                                                                                                                                                                                                                                                                 |                                                   |
| -  | Paramere (Fig. 77) with apical margin straight or slightly convex. (S. China, Laos)                                                                                                                                                                                                                          | <i>G. montana sinensis</i> subsp. n. (p. 311)     |
| 9  | Length of antennal segment I divided by width of head including eyes less than 1.20                                                                                                                                                                                                                          | 10                                                |
| -  | Length of antennal segment I divided by width of head including eyes greater than 1.20                                                                                                                                                                                                                       | 11                                                |
| 10 | Length of antennal segment II divided by length of antennal segment I about 0.79. (S. India)                                                                                                                                                                                                                 | <i>G. indica</i> sp. n. (p. 307)                  |
| -  | Length of antennal segment II divided by length of antennal segment I about 0.86. (Java)                                                                                                                                                                                                                     | <i>G. solitaria</i> sp. n. (p. 309)               |
| 11 | Paramere (Fig. 73) with blade broad. (India)                                                                                                                                                                                                                                                                 | <i>G. rubra</i> sp. n. (p. 309)                   |
| -  | Paramere (Fig. 75) with blade narrower. (Australia: Horn I. only)                                                                                                                                                                                                                                            | <i>G. insularia</i> sp. n. (p. 309)               |
| 12 | Longitudinal arms of sclerites of gynatrial wall each with a broad, triangular expansion distally (Figs 86, 106-108); second valvula apically bilobed, longer lobe rounded apically. ( <i>horrens</i> -group)                                                                                                | 13                                                |
| -  | Longitudinal arms of sclerites of gynatrial wall each distally curved or angled outwards but not expanded, of almost uniform width throughout (Figs 103-105); second valvula apically almost uniformly rounded or truncate or bilobed with the longer lobe acutely pointed apically. ( <i>indica</i> -group) | 16                                                |
| 13 | Second valvula (Fig. 102) with longer lobe narrowly rounded at apex, shorter lobe not very prominent; tergum IX unicolorous. (Tropical Australia)                                                                                                                                                            | <i>G. australiensis</i> sp. n. (p. 318)           |
| -  | Second valvula (Figs 96-101) with longer lobe more broadly rounded, shorter lobe (except in <i>indecora</i> ) prominent; tergum IX with a conspicuous, brown, median macula.                                                                                                                                 | 14                                                |
| 14 | Second valvula (Fig. 100) with shorter lobe scarcely prominent. (Flores, Timor)                                                                                                                                                                                                                              | <i>G. indecora</i> (Walker) (p. 316)              |
| -  | Second valvula (Figs 96-99, 101) with both lobes well developed                                                                                                                                                                                                                                              | 15                                                |
| 15 | Second valvula (Fig. 101) with longer lobe about as broadly rounded as shorter lobe. (New Guinea and adjacent island groups)                                                                                                                                                                                 | <i>G. irianensis</i> sp. n. (p. 316)              |
| -  | Second valvula (Figs 96-99) with longer lobe more narrowly rounded than shorter lobe. (Widespread in Oriental region). ( <i>G. horrens</i> (Dohrn))                                                                                                                                                          | 5                                                 |
| 16 | Second valvula (Fig. 90) with apex broadly rounded                                                                                                                                                                                                                                                           | 17                                                |
| -  | Second valvula (Figs 91-95) with apex acutely pointed or obliquely truncate                                                                                                                                                                                                                                  | 18                                                |
| 17 | Length of antennal segment I divided by width of head including eyes less than 1.15. (India)                                                                                                                                                                                                                 | <i>G. indica</i> sp. n. (p. 307)                  |
| -  | Length of antennal segment I divided by width of head including eyes greater than 1.15. (India)                                                                                                                                                                                                              | <i>G. soror</i> sp. n. (p. 307)                   |
| 18 | Second valvula (Fig. 95) with apex obscurely bilobed, longer lobe very prominent and acute. (Vietnam)                                                                                                                                                                                                        | <i>G. dissimilis</i> sp. n. (p. 312)              |
| -  | Second valvula (Figs 91-94) with apex obliquely truncate ( <i>G. montana</i> sp. n.)                                                                                                                                                                                                                         | 19                                                |
| 19 | Second valvula (Figs 91, 92) with lobe on outer face weakly prominent. (N. India, Sikkim)                                                                                                                                                                                                                    | <i>G. montana montana</i> subsp. n. (p. 311)      |
| -  | Second valvula (Figs 93, 94) with lobe on outer face strongly prominent. (S. China, Laos)                                                                                                                                                                                                                    | <i>G. montana sinensis</i> subsp. n. (p. 311)     |



## Descriptions of species

### The *indica*-group

Genital capsule with tongue acutely pointed (Fig. 68). Paramere with blade broad (Figs 72–78). Con-junctiva with distal dorsolateral lobes short (Fig. 82). Sclerites of wall of gynatrium with apex of longi-tudinal arm curved or angled outwards at apex but not triangularly expanded (Figs 103–105).

#### *Gralliclava indica* sp. n.

(Figs 68, 72, 90, 103)

Length: ♂, 7.0–7.7 mm, mean 7.2 mm (n=15); ♀, 7.5–7.7 mm (n=4).

Characters of the genus and of the species-group. Antennae rather short, ratio of lengths of antennal segments I : II : III : IV about 1.00 : 0.79 : 0.63 : 0.89; length of segment III divided by that of seg-ment II 0.76–0.85, mean 0.80 (n=15); length of segment I divided by width of head including eyes 1.03–1.12, mean 1.07 (n=17). Ratio of lengths of rostral segments I : II : III : IV about 1.00 : 1.02 : 0.47 : 0.90. Pronotum with posterolateral spines slightly upcurved, rather short, width of pronotum across tips of spines divided by width of head including eyes 2.25–2.55, mean 2.40 (n=17).

Male genital capsule (Fig. 68) with tongue acute. Paramere (Fig. 72) with apical margin rounded, tooth on inner margin broad and moderately prominent. Female with apex of second valvula (Fig. 90) rounded, sclerites of gynatrial wall with inner arms of almost uniform width in dorsal aspect, apices obliquely divergent (Fig. 103).

Head and pronotum moderately strongly granulate, rest of body and appendages very weakly granulate.

Head, exposed parts of thorax and abdomen, antennae, legs, clavus and corium with short, fine, suberect pubescence; head, abdominal sternites and exposed parts of thorax also with decumbent, white, woolly pubescence, femora with similar but very sparse woolly pubescence. Thoracic pleura and lateral areas of abdominal sternites with patches of very dense, felted, white pubescence.

Head, pronotum, scutellum, thoracic pleura and sterna dark red. Antennae with segments I–III stramineous, IV reddish brown. Hemelytra stramineous with apex of corium dark red. Rostrum, tarsi, anterior and intermediate tibiae and metathoracic scent-gland auricle stramineous. Anterior and inter-mediate femora stramineous with apical half obscurely reddish, posterior femur with basal half stramineous, apical half dark red with three irregular stramineous patches on anterior face and three on posterior face. Posterior tibiae stramineous with dark red basal annulus and obscure reddish markings at middle and apex of dorsal side. Abdominal sternites pale reddish brown with blackish brown markings medially on sternites V and VI and mediolaterally on III and IV and with a large stramineous spot on lateral margins of VI and VII. Laterotergites each stramineous anteriorly, red posteriorly. Tergites dark red, VI and VII stramineous anterolaterally, red-brown posteriorly.

REMARKS. All of the specimens mentioned by Distant (1918 : 159) belong to this species. It may be distinguished from the other peninsular-Indian species of its species-group by the greater length of antennal segment III relative to that of segment II and from the other members of the species-group with segment III long by the short sclerites of the gynatrial wall, the apically rounded second valvula and the less strongly developed tooth on the inner side of the male para-mere.

DISTRIBUTION. Southern India.

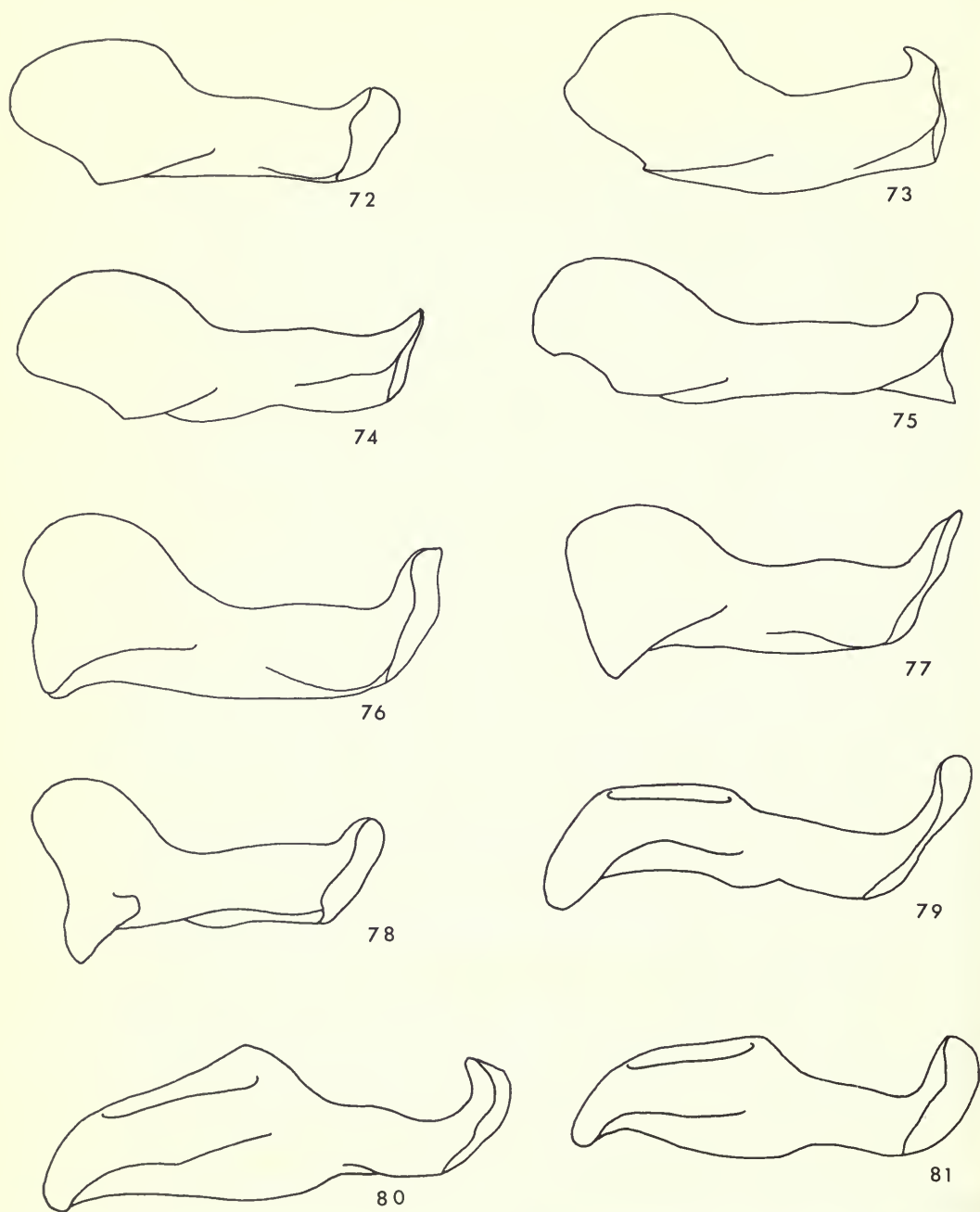
MATERIAL EXAMINED. Holotype ♂, INDIA: Chikkaballapura (*T. V. Campbell*) (BMNH, London).

Paratypes. INDIA: 7 ♂, 2 ♀, same data as holotype; 2 ♂, Kodai Kanal (*Campbell*); 4 ♂, 'South India' (*Campbell*); 1 ♂, Kotagiri (*Atkinson*) (all in BMNH, London); 3 ♂, 2 ♀, Utakamand (*Atkinson*) (UM, Oxford); 1 ♀, Utakamand (*Atkinson*) (BMNH, London).

#### *Gralliclava soror* sp. n.

Length: ♀, 7.8–8.0 mm, mean 7.9 mm (n=4); ♂ unknown.

Closely resembles *G. indica*. Ratio of antennal segments I : II : III : IV about 1.00 : 0.82 : 0.68 : 0.82; length of segment III divided by that of segment II 0.75–0.79, mean 0.76 (n=4); length of segment I divided by head width including eyes 1.20–1.27, mean 1.22 (n=4). Pronotum with posterolateral spines straight, not upturned, width of pronotum across tips of spines divided by width of head including eyes 2.45–2.50, mean 2.48 (n=4). Woolly pubescence less dense than in *G. indica*. Female genitalia as in *G. indica*.



Figs 72–81 *Gralliclava* species, dorsomedial view of left paramere. (72) *indica*; (73) *rubra* (holotype); (74) *solitaria* (holotype); (75) *insularia* (holotype); (76) *montana montana* (holotype); (77) *montana sinensis* (holotype); (78) *dissimilis*; (79) *australiensis*; (80) *irianensis*; (81) *horrens horrens*.

REMARKS. Differs from *G. indica* in the proportions of the lengths of the antennal segments and in the straight posterolateral pronotal spines. Male unknown.

DISTRIBUTION. Known only from one locality in India.

MATERIAL EXAMINED. Holotype ♀, INDIA: Bombay (*Distant* collection) (BMNH, London).

Paratypes. INDIA: 2 ♀, Bombay (*Distant* collection); 1 ♀, Bombay (*R. R. Holmes* purchase) (all in BMNH, London).

*Gralliclava rubra* sp. n.

(Fig. 73)

Length: ♂, 7.6 mm (n=1); ♀ unknown.

Closely resembles *G. indica*. Ratio of lengths of antennal segments unknown (specimen damaged), length of segment I divided by width of head including eyes 1.34. Pronotal posterolateral spines longer and more slender than those of *G. indica*, width across tips of spines divided by width of head including eyes 2.76. Colour paler, brighter red than in *G. indica*. Male paramere slightly broader than in that species (Fig. 73).

REMARKS. Appears to be very closely related to *G. indica*, and can only be distinguished with certainty by the slight difference in the shape of the paramere. Although the ratio pronotum width/head width is within the range given for *indica* the disc of the pronotum is narrower than in that species, so that the posterolateral spines appear distinctly longer when the two species are seen together. Female unknown.

DISTRIBUTION. Known only from one locality in India.

MATERIAL EXAMINED. Holotype ♂, INDIA: Khandala, 15.x.1944 (*D. Leston*) (BMNH, London).

*Gralliclava solitaria* sp. n.

(Fig. 74)

Length: ♂, 7.0 mm (n=1); ♀, 7.8 mm (n=1).

Very similar to *G. indica*. Ratio of lengths of antennal segments I : II : III : IV in male 1.00 : 0.86 : 0.67 : 1.00, in female 1.00 : 0.87 : 0.68 : 0.89; length of segment III divided by that of segment II 0.78 in both sexes; length of segment I divided by width of head including eyes 1.12 in both sexes. Width of pronotum across tips of posterolateral spines divided by width of head including eyes in male 2.45, in female 2.80. Male paramere (Fig. 74) with tooth less prominent than that of *G. indica*. Colour darker red than in *G. indica*, posterior femur with apical half dark red with a single, irregular stramineous spot anteriorly and posteriorly.

REMARKS. Differs from *G. indica* in the relative lengths of the antennal segments, also in the shape of the paramere. In the only female specimen available the genitalia were too badly damaged to examine.

DISTRIBUTION. Known from a single locality in Java.

MATERIAL EXAMINED. Holotype ♂, JAVA: G. Tangkoeban Pranhoe, Preanger, 4000–5000 voet (1200–1500m), xi.1936 (*F. C. Drescher*) (RNH, Leiden).

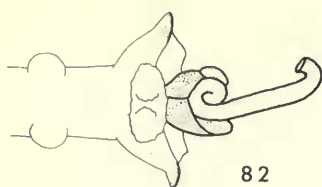
Paratype. JAVA: 1 ♀, same data as holotype except for date, i.1937 (RNH, Leiden).

*Gralliclava insularia* sp. n.

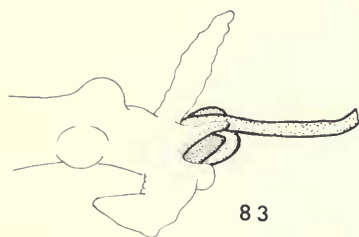
(Fig. 75)

Length: ♂, 7.2 mm (n=1); ♀ unknown.

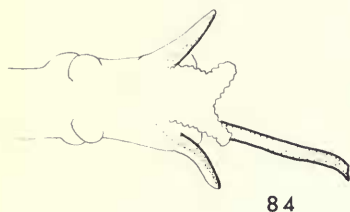
Very similar to *G. indica*. Ratio of lengths of antennal segments I : II : III as 1.00 : 0.81 : 0.60 (IV missing in specimen examined); length of segment III divided by length of segment II 0.74; length of segment I divided by width of head including eyes 1.31 (n=1 in each case). Width of pronotum across tips of posterolateral spines divided by width of head including eyes about 2.50 (single specimen examined with spines damaged). Paramere (Fig. 75) with blade narrower than in the other species related to *G. indica*.



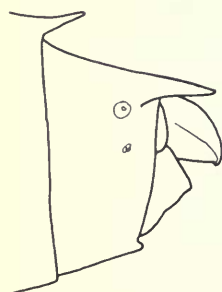
82



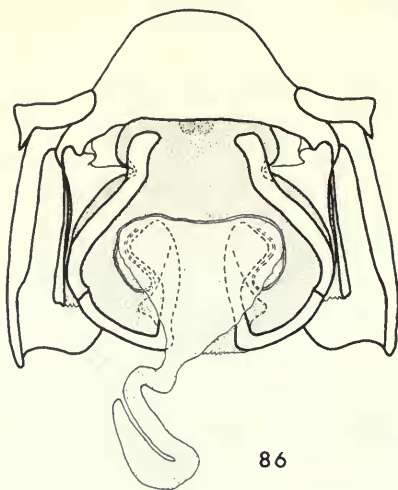
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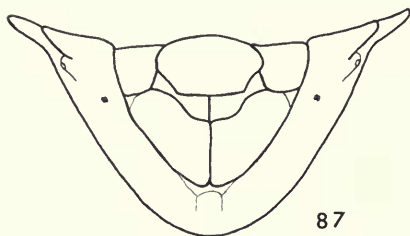
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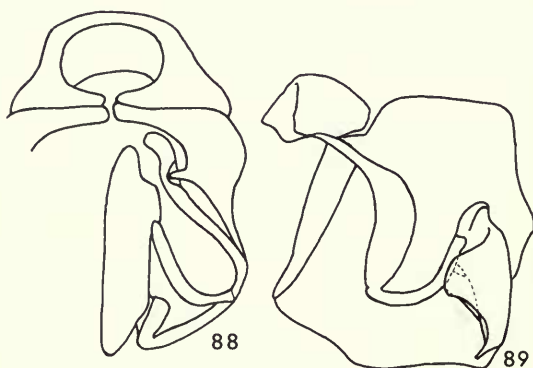
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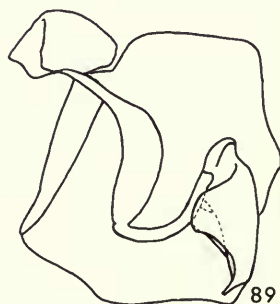
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89

**Figs 82–89** *Gralliclava* species. (82) *montana montana*, dorsal view of conjunctiva and vesica; (83 & 84) *horrens horrens*, left lateral and dorsal views of same; (85) *horrens horrens*, left lateral view of ♀ abdomen from posterior margin of segment VI to apex; (86) *horrens horrens*, dorsal view of structures of ♀ abdominal segments VIII and IX (tergum VIII removed); (87) *horrens horrens*, apical view of ♀ abdominal segments VII–IX; (88) *horrens horrens*, ventral view of ♀ abdominal segment IX (paired structures of left side omitted); (89) *horrens horrens*, medial view of paired structures of right side of ♀ abdominal segment VIII, i.e. paratergite, gonangulum (part of IX), valvifer, valvula and ramus. Stipple in Figs 82–84 indicates sclerotized parts; in Fig. 86 stipple indicates membrane, sparse stipple indicating gynatrial sac.



REMARKS. Although this species has been collected only in a locality remote from the range of the other species of the *indica*-group the unique paramere shape suggests that its presence there is not due to a chance introduction by commerce.

DISTRIBUTION. Known only from the type-locality, a small island off Cape York, Queensland.

MATERIAL EXAMINED. Holotype ♂, AUSTRALIA: Torres Straits, Horn Island (no other data) (SAM, Adelaide).

*Gralliclava montana* sp. n.

(Figs 76, 77, 82, 91–94, 104)

Length: 7.8–9.4 mm.

Similar to *G. indica* but larger and darker red. Pronotum with posterolateral spines long, distinctly upcurved. Male with paramere (Figs 76, 77) bearing on inner face a broad, triangular tooth close to apex. Female with second valvula (Figs 91–94) obliquely truncate at apex, sclerites of wall of gynatrium (Fig. 104) long.

REMARKS. This species is readily distinguished from others related to *G. indica* by the shape of the paramere and second valvula.

DISTRIBUTION. Two subspecies, one in the southern Himalayas and one in southern China and Indochina.

*Gralliclava montana montana* subsp. n.

(Figs 76, 82, 91, 92, 104)

Length: ♂, 8.0–8.5 mm, mean 8.3 mm (n=3); ♀, 7.8–8.8 mm, mean 8.3 mm (n=6).

Ratio of lengths of antennal segments I : II : III : IV about 1.00 : 0.71 : 0.62 : 0.88; length of segment III divided by length of segment II 0.85–0.91, mean 0.87 (n=8); length of segment I divided by width of head including eyes in male 1.32–1.45, mean 1.37 (n=3), in female 1.10–1.24, mean 1.14 (n=6). Width of pronotum across tips of posterolateral spines divided by width of head including eyes 2.50–2.85, mean 2.64 (n=9). Male paramere with distal margin of tooth not forming a continuous line with apical margin of blade (Fig. 76). Second valvula of ovipositor (Figs 91, 92) with a small protuberance on outer face. Apical half of posterior femur dark red with usually a single, discrete stramineous spot on anterior and on posterior face.

REMARKS. Distinguished from the following subspecies by the shape of the paramere and the shape of the second valvula. One female from Kumaon has more extensive pale markings in the apical half of the posterior femur, resembling the typical colour pattern of *G. indica*.

DISTRIBUTION. Southern slopes and foothills of the Himalayas.

MATERIAL EXAMINED. Holotype ♂, INDIA: W. Almora, Kumaon (*H. G. Champion*) (BMNH, London).

Paratypes. INDIA: 1 ♂, 2 ♀, same data as holotype; 3 ♀, Darjeeling, Gopaldhara, 4720 feet (1430 m), 2–21.v.1918, one ex. from flowers (*H. Stevens*). NEPAL: 1 ♀, Ghanpokhara, 5500–7000 ft (1700–2100 m), 2.v.1954 (*J. Quinlan*). SIKKIM: 1 ♂ (*Distant* collection). (All in BMNH, London.)

*Gralliclava montana sinensis* subsp. n.

(Figs 77, 93, 94)

Length: ♂, 8.6–8.8 mm, mean 8.7 mm (n=3); ♀, 8.3–9.7 mm (n=2).

Ratio of lengths of antennal segments I : II : III : IV about 1.00 : 0.73 : 0.63 : 0.91; length of segment III divided by length of segment II 0.85–0.89, mean 0.87 (n=4); length of segment I divided by width of head including eyes in male 1.17–1.34, mean 1.27 (n=3), in female 1.12–1.25 (n=2). Width of pronotum across tips of posterolateral spines divided by width of head including eyes 2.74–3.19, mean 2.92 (n=5). Male paramere (Fig. 77) with distal margin of tooth forming a continuous straight or slightly convex line with apical margin of blade. Second valvula of ovipositor (Figs 93, 94) with a large protuberance on the outer face, projecting dorsolaterally beyond the dorsal margin of the valvula when the

latter is examined flat. Apical half of posterior femur with a single, obscure, pale spot on anterior and on posterior face.

REMARKS. Distinguished from the nominate subspecies by the shape of the paramere and of the second valvula. The differences are slight and, in the case of the paramere, variable but are nonetheless constant.

DISTRIBUTION. Southern China and Indochina.

MATERIAL EXAMINED. Holotype ♂, CHINA: Kwangtung, Sheung-shui-heung, Lin-hsien (District), 9–10.xi.1934 (*F. K. To*) (BMNH, London).

Paratypes. CHINA: 1 ♂, Fukien, Chung An, Bohea Hills, 22.x.1939 (*T. C. Maa*); 2 ♀, Fukien, Shaowu, Ta Chu Lan, 25.vi.1942 and 9.vi.1943 (*Maa*) (all in BPBM, Honolulu). LAOS: 1 ♂, Xieng Khouang, 11.v.1919 (*R. V. de Salvaza*) (BMNH, London).

### *Gralliclava dissimilis* sp. n.

(Figs 78, 95, 105)

Length: ♂, 7.1 mm ( $n=3$ ); ♀, 7.7 mm ( $n=3$ ).

Similar to *G. indica*. Ratio of lengths of antennal segments I : II : III : IV about 1.00 : 0.77 : 0.67 : 0.98; length of segment III divided by length of segment II 0.82–0.91, mean 0.87 ( $n=4$ ); length of segment I divided by width of head including eyes 1.26–1.39, mean 1.30 ( $n=6$ ). Pronotum with posterolateral spines gently upcurved, width across tips of spines divided by width of head including eyes 2.48–2.61, mean 2.54 ( $n=6$ ). Male paramere (Fig. 78) of characteristic shape, with very prominent tooth on inner face. Second valvula of ovipositor (Fig. 95) with a large dorsolateral protuberance and with apex acutely pointed, prominent. Sclerites of wall of gynatrium long (Fig. 105). Colour darker red than in *G. indica*, pale markings at apex of posterior femur smaller and fewer than in that species.

REMARKS. The peculiar shape of the paramere distinguishes this species from all others in the genus. The presence of a dorsolateral protuberance on the second valvula suggests affinities to *G. montana*.

DISTRIBUTION. Known only from the type-locality in Vietnam.

MATERIAL EXAMINED. Holotype ♂, VIETNAM: 6 miles (9.5 km) S. of Dalat, 1400–1500 m, 9.vi–7.vii.1961 (*N. R. Spencer*) (BPBM, Honolulu).

Paratypes. VIETNAM: 2 ♂, 3 ♀, same data as holotype (BPBM, Honolulu and BMNH, London).

### The *horrens*-group

Genital capsule with tongue truncate (Figs 69, 70). Paramere with blade narrow apically (Figs 79–81). Conjunctiva with distal dorsolateral lobes long (Fig. 84). Sclerites of wall of gynatrium with apex of longitudinal arm triangularly expanded (Figs 86, 106–108).

### *Gralliclava horrens* (Dohrn) comb. n.

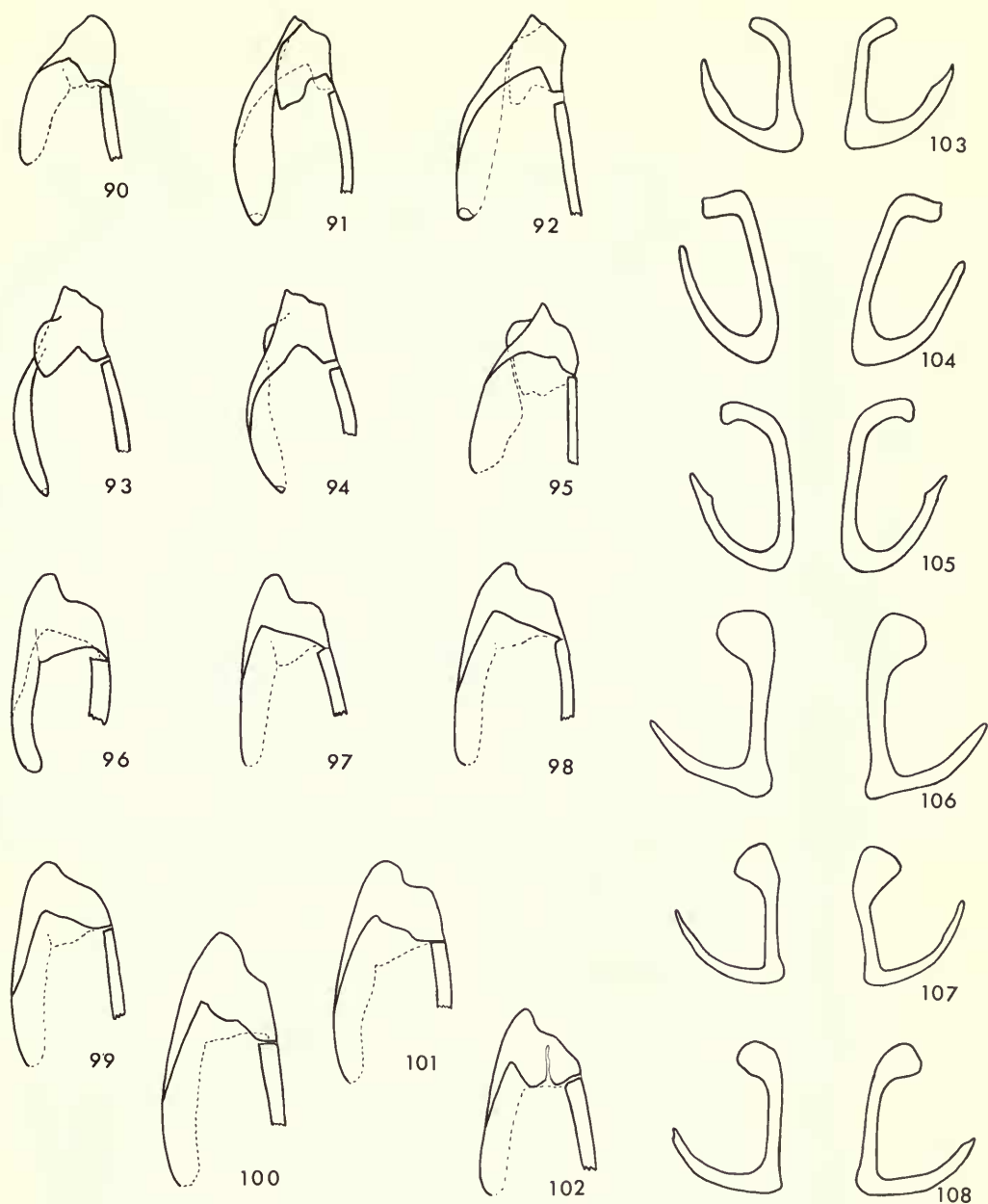
(Figs 67, 69, 71, 81, 83–89, 96–99)

*Clavigralla horrens* Dohrn, 1860 : 403. LECTOTYPE ♀, SRI LANKA (IZPAN, Warsaw), here designated [examined].

*Clavigralla spinofemoralis* Shiraki, 1913 : 225. Type-series from TAIWAN (Taihoku) [not traced]. **Syn. n.**

Length: ♂, 6.5–8.5 mm, mean 7.6 mm ( $n=86$ ); ♀, 7.2–8.9 mm, mean 8.0 mm ( $n=85$ ).

Characters of the genus and of the species-group. Ratio of lengths of antennal segments I : II : III : IV about 1.00 : 0.79 : 0.67 : 0.93; length of segment III divided by length of segment II 0.82–0.86 (population means). Ratio of lengths of rostral segments I : II : III : IV about 1.00 : 0.96 : 0.48 : 0.87. Male paramere (Fig. 81) with blade narrowly triangular, its apex markedly produced and its ventromedian edge moderately convex for basal three-quarters of its length. Genital capsule with tongue rectangularly produced, apically truncate, not notched in middle of posterior margin (Fig. 69). Second valvula of ovipositor (Figs 96–99) with apex bilobed, the inner (upper) lobe narrower and more prominent than the lower and bluntly angulate at apex. Sclerites of gynatrial wall with median arms in dorsal view triangularly broadened and divergent posteriorly (Fig. 86).



**Figs 90–108** *Gralliclava* species. (90) *indica*, medial view of right second valvula; (91 & 92) *montana montana*, median and lateral views of same; (93 & 94) *montana sinensis*, same; (95) *dissimilis*, medial view of same; (96 & 97) *horrens horrens* (Ceylon), lateral and medial views of same; (98) *horrens horrens* (Uttar Pradesh), medial view of same; (99) *horrens horrens* (Java), same; (100) *indecora* (holotype), same; (101) *irianensis*, same; (102) *australiensis*, same; (103) *indica*, dorsal view of sclerites of wall of gynatrium; (104) *montana montana*, same; (105) *dissimilis*, same; (106) *indecora* (holotype), same; (107) *irianensis*, same; (108) *australiensis*, same.

Sculpture, pilosity and colour generally as in *G. indica*. Female abdominal tergite IX always with a piceous median macula. Posterior femur with one or two stramineous spots on anterior and posterior faces in dark red apical half.

REMARKS. A widespread and common species which may be distinguished from its congeners by the shape of the paramere and of the second valvula.

DISTRIBUTION. Oriental region, from Sri Lanka, India, southern China and Taiwan southwards and eastwards to the lesser Sunda Islands. Two subspecies, one restricted to Palawan (Philippines).

*Gralliclava horrens horrens* (Dohrn)

(Figs 69, 71, 81, 83–89, 96–99)

*Clavigralla horrens* Dohrn, 1860 : 403.

Length: ♂, 6.5–8.5 mm, mean 7.6 mm (n=81); ♀, 7.2–8.9 mm, mean 8.0 mm (n=76).

Length of antennal segment III divided by length of segment II 0.76–0.91 (n=254), population means vary from 0.81 to 0.86. Length of antennal segment I divided by width of head including eyes 1.06–1.38 (n=254), population means vary from 1.16 to 1.35. Pronotum with posterolateral angles directed laterally (Fig. 71), posterolateral spines gently upcurved, width across tips of spines divided by width of head including eyes 2.39–3.15 (n=254), population means vary from 2.56 to 2.91. Form of male and female genitalia (Figs 69, 81, 83–89, 96–99) very constant throughout the range of the subspecies, inner (upper) lobe of second valvula sometimes slightly shorter than normal (Fig. 99).

REMARKS. Differs from the following subspecies chiefly in the shape of the pronotum. Local variation is considerable in this widespread species, but this variation is not clinal. There was insufficient material from some islands to determine if some of these forms deserved subspecific or higher ranking. A long series from Java closely resembled the population on the Asian mainland. The three available specimens from different localities in Sumatra all had the apical half of the posterior femur uniformly red, devoid of paler markings. The second valvula of specimens from Taiwan and some localities in northern India displayed a slightly shorter inner (upper) lobe (Fig. 99) than that found in the other parts of the geographical range. Specimens from the eastern parts of the range had parameres in which the apex was slightly less prominent and the

**Table 1.** Variation in lengths of antennal segments and width of pronotum in *Gralliclava horrens horrens* (Dohrn)

| Locality      | Length of antennal segment III divided by length of segment II |          |      | Length of antennal segment I divided by width of head |          |      | Width of pronotum divided by width of head |          |      | Number of specimens measured |
|---------------|----------------------------------------------------------------|----------|------|-------------------------------------------------------|----------|------|--------------------------------------------|----------|------|------------------------------|
|               | Mini-mum                                                       | Maxi-mum | Mean | Mini-mum                                              | Maxi-mum | Mean | Mini-mum                                   | Maxi-mum | Mean |                              |
| Sri Lanka     | 0.81                                                           | 0.91     | 0.86 | 1.20                                                  | 1.32     | 1.26 | 2.48                                       | 2.78     | 2.67 | 9                            |
| India*        | 0.81                                                           | 0.87     | 0.85 | 1.15                                                  | 1.34     | 1.23 | 2.46                                       | 2.82     | 2.59 | 18                           |
| China†        | 0.79                                                           | 0.87     | 0.83 | 1.12                                                  | 1.30     | 1.19 | 2.68                                       | 3.15     | 2.85 | 34                           |
| Thailand      | 0.79                                                           | 0.86     | 0.83 | 1.15                                                  | 1.35     | 1.25 | 2.41                                       | 2.82     | 2.59 | 21                           |
| Indochina     | 0.80                                                           | 0.85     | 0.83 | 1.12                                                  | 1.30     | 1.21 | 2.39                                       | 2.72     | 2.56 | 13                           |
| West Malaysia | 0.82                                                           | 0.89     | 0.85 | 1.12                                                  | 1.38     | 1.26 | 2.48                                       | 2.88     | 2.70 | 12                           |
| Taiwan        | 0.80                                                           | 0.84     | 0.82 | 1.13                                                  | 1.32     | 1.24 | 2.53                                       | 2.75     | 2.68 | 6                            |
| Luzon         | 0.81                                                           | 0.87     | 0.83 | 1.06                                                  | 1.28     | 1.16 | 2.50                                       | 2.78     | 2.65 | 16                           |
| Mindanao      | 0.82                                                           | 0.89     | 0.84 | 1.14                                                  | 1.30     | 1.21 | 2.45                                       | 2.97     | 2.66 | 108                          |
| Java          | 0.77                                                           | 0.88     | 0.82 | 1.11                                                  | 1.36     | 1.24 | 2.40                                       | 2.74     | 2.61 | 15                           |
| Sumatra       | 0.76                                                           | 0.86     | 0.81 | 1.14                                                  | 1.38     | 1.26 | 2.77                                       | 2.91     | 2.84 | 3                            |
| Borneo        | 0.82                                                           | 0.86     | 0.83 | 1.32                                                  | 1.37     | 1.35 | 2.82                                       | 3.04     | 2.91 | 4                            |
| Sulawesi      | 0.81                                                           | 0.83     | 0.82 | 1.19                                                  | 1.33     | 1.26 | 2.51                                       | 2.78     | 2.63 | 5                            |

\* Including Nepal and Sikkim.

† Including Hong Kong.



ventrolateral edge slightly less convex, approaching the shape of the paramere of *G. irianensis*, though clearly distinct from it. Specimens from mainland China had, on average, a shorter antennal segment I and longer pronotal spines than those of most other populations and were in these respects the most distinct of the mainland populations. Variation in the lengths of the antennal segments and pronotal spines is summarized in Table 1.

**DISTRIBUTION.** Sri Lanka, India, S. China eastwards to Taiwan, Philippines (except Palawan) and Sunda Islands.

**MATERIAL EXAMINED.** *Clavigralla horrens* Dohrn, lectotype ♀, SRI LANKA (*Nietner*) (IZPAN, Warsaw).

Numerous specimens from the following localities. SRI LANKA: Colombo; Kandy; Pundaloya; Madulsima; Nitagula. INDIA: Uttar Pradesh, Ranikhet; Uttar Pradesh, Lansdowne Division; Western Almora, Kumaon; Malabar, Amarambalam Forest; Assam; Devala, Nilgiri Hills. SIKKIM (no further data). NEPAL: Taplejung District. HONG KONG. CHINA: Hainan I., Nodda; Fukien, Chung An, Bohea Hills; Fukien, Yungan City; Fukien, Shaowu, Shui Pei Kai; Fukien, Haiteng, Hungkeng; Fukien, Lo Fou Mountains; Yunnan, San-nen-Kai. BURMA: Carin, Askiuii Ghecu; Rangoon. THAILAND: Chiangmai, Pangmakampon, near Fang; Doi Suthep; Fang; 50 km W. of Tak; Parjinburi Province, Amphur Kabinburi; Bankau. LAOS: Île de Khong; Dong Dok; Borikhame Province, Pakkading. VIETNAM: north-west of Phan Rang; Karyu Danar; Ninh Hoa and Dai Lan, N. of Nha Trang; M'Drak, E. of Ban Me Thuot. WEST MALAYSIA: Pahang; Perak; Kuala Lumpur; Langkawi Is. TAIWAN: Bukai-Musha; Puli; Kuraru, Hengchun Park. PHILIPPINES: Luzon, Trinidad; Luzon, Baguio; Luzon, Los Baños, Luzon, Balbalasan; Luzon, Lubuagan; Luzon, Mt Caraballo; Luzon, Manila; Luzon, Benquet; Luzon, Isabela San Mariano; Luzon, Bataan; Luzon, Rizal, Montalban; Luzon, Mt Iriga; Luzon, Mt Isarog; Luzon, Ft McKinley; Luzon, Mayoyao, Ifugao; Busuanga, 4 km N. of San Nicolaso; Samar, Catbalogan; Panay, Capiz, Mindanao; Negros, Dumaguete; Bohol; Leyte, Utap; Leyte, Palo; Mindanao, Momungan; Mindanao, Sapamoro; Mindanao, Bukidon, Malaybalay, Alanib; Mindanao, Lanao; Mindanao, Dansalan; Mindanao, Zamboanga; Mindanao, Balason; Mindanao, Mt Malindang; Mindanao, Davao; Mindanao, Zamboanga; Mindanao, Lemesahan. BORNEO: Sabah, Keningan; Sabah, Ranau; Sarawak, Sarikei District, Rejang Delta; Sarawak, Bau District, Pangkalan Tebang. SUMATRA: Sungei Kumbang, Corinchi; Deli; Serdang, Tandjong Morawa. JAVA: Semarang; Cheribon; Bogor. POSTILJON ISLANDS: Sapoeke Besar. SULAWESI: Makassar; Gorontalo; Salayer I.; Sula Is. TIMOR: Ermera; Dili. WETTER (no locality stated). (BMNH, London; AMNH, New York; BPBM, Honolulu; RNH, Leiden; UZM, Copenhagen; SAM, Adelaide.)

*Gralliclava horrens palawanensis* subsp. n.

(Fig. 67)

Length: ♂, 7.1–7.5 mm, mean 7.3 mm (n=5); ♀, 7.7–8.3 mm, mean 8.0 mm (n=9).

Length of antennal segment I divided by width of head including eyes 1.23–1.43, mean 1.30 (n=14). Posterolateral angles and spines of pronotum (Fig. 67) directed obliquely forwards, width across tips of spines divided by width of head including eyes 2.35–2.69, mean 2.53 (n=14). Otherwise similar to typical subspecies in appearance, genitalia, sculpture, pubescence and colour.

**REMARKS.** Readily distinguished from the nominate subspecies and all other species of the genus by the shape of the pronotum. Several collections have been made at various times and in a number of different localities in Palawan, but no specimen with the pronotal posterolateral spines and angles directed laterally has been found there. Because of the similarity of the Palawan population to other *horrens* populations in genitalia and other characters and because of the allopatry of populations exhibiting the two forms of pronotum subspecific status seems appropriate.

**DISTRIBUTION.** Known only from Palawan Island in the Philippines.

**MATERIAL EXAMINED.** Holotype ♂, PHILIPPINES: Palawan, Punta Baha, 26.v.1958 (*H. E. Milliron*) (BPBM, Honolulu).

Paratypes. PHILIPPINES: 1 ♂, 1 ♀, Palawan, Bacuit (*G. Böttcher*) (BMNH, London); 1 ♀, Palawan, Binaluan, xi-xii.1913 (*G. Boettcher*) (BMNH, London); 2 ♂, 1 ♀, Palawan, Brooke's Point, Macagua, 75 m, 1-4.iv.1962 (*M. Thompson*) (BPBM, Honolulu and BMNH, London); 2 ♂, Palawan, Brooke's Point, Uring Uring, 18.viii.1961 and 20.ix.1961 in Malaise trap (*Noona Dan Expedition*) (UZM, Copenhagen); 1 ♀, Palawan, Tarumpitao Point, in jungle, 3.vi.1958 (*H. E. Milliron*) (BPBM, Honolulu); 6 ♀, Palawan, Eran Point, 8 km SW. of Tarumpitao Point, 31.xii.1959-4.i.1960 (*L. W. Quate*) (BPBM, Honolulu and BMNH, London); 1 ♂, 1 ♀, Palawan, Mantalingajan, Pinigisan, 600 m, 1.ix.1961 (*Noona Dan Expedition*) (UZM, Copenhagen).

***Gralliclava indecora* (Walker) sp. rev., comb. n.**

(Figs 100, 106)

*Cletus ? indecorus* Walker, 1871 : 197. Holotype ♀, FLORES (Indonesia) (BMNH, London) [examined].  
*Clavigralla indecora* (Walker) Distant, 1901 : 426.

[*Clavigralla horrens* Dohrn; Bergröth, 1913 : 156. *Cletus ? indecorus* Walker incorrectly synonymized with *Clavigralla horrens* Dohrn.]

Length: ♀, 8.7-8.8 mm (n=2); ♂ unknown.

Very similar to *G. horrens*. Ratio of lengths of antennal segments I : II : III : IV as 1.00 : 0.75 : 0.66 : 0.89 (type) or 1.00 : 0.83 : 0.67 : 0.98; length of segment III divided by length of segment II 0.88 (type) or 0.80; length of segment I divided by width of head including eyes 1.25 (type) or 1.20. Width of pronotum across posterolateral spines divided by width of head including eyes 2.53 (type) or 2.77. Ovipositor with second valvula having inner (upper) lobe long, outer (lower) lobe obsolete (Fig. 100). Sclerites of gynatrial wall (Fig. 106) similar to those of *G. horrens*. Male unknown. Anterior and intermediate femora with apical half dark red with a few stramineous spots.

REMARKS. Differs from other species of the subgenus in the shape of the second valvula. Differs from *G. horrens* in the coloration of the anterior and intermediate femora (in *horrens* the apical halves of these femora are paler red with more extensive pale markings). Sympatric with *horrens* at least in Timor. Walker (1871 : 197) erroneously indicated the sex of the type-specimen as male.

DISTRIBUTION. Flores and Timor in Indonesia.

MATERIAL EXAMINED. *Cletus ? indecorus* Walker, holotype ♀, FLORES (Indonesia) (*Saunders* collection) (BMNH, London).

TIMOR: 1 ♀, Wienek (RNH, Leiden).

***Gralliclava irianensis* sp. n.**

(Figs 80, 101, 107)

Length: ♂, 7.1-8.8 mm, mean 7.5 mm (n=36); ♀, 7.7-9.3 mm, mean 8.3 mm (n=30).

Very similar to *G. horrens*. Ratio of lengths of antennal segments I : II : III : IV about 1.00 : 0.83 : 0.68 : 0.86; length of segment III divided by length of segment II 0.76-0.87, mean 0.81 (n=56); length of segment I divided by width of head including eyes 1.23-1.46, mean 1.33 (n=61). Pronotal posterolateral spines rather long, upcurved, width across tips of spines divided by width of head including eyes 2.51-3.08, mean 2.71 (n=61). Male with paramere (Fig. 80) with apex slightly produced, and its ventromedian edge weakly convex for basal two-thirds of its length. Tongue of genital capsule as in *G. horrens*. Second valvula of ovipositor (Fig. 101) bilobed, both lobes broadly rounded, the inner (upper) lobe more prominent. Sclerites of gynatrial wall (Fig. 107) similar to those of *horrens*. Posterior femur with apical half dark red, usually devoid of paler markings.

REMARKS. Differs from other species of the genus in the shape of the paramere and of the second valvula.

DISTRIBUTION. New Guinea and adjacent island groups.

MATERIAL EXAMINED. Holotype ♂, NEW GUINEA: Papua, Mondo, 5000 ft (1500 m), ii.1934 (*L. E. Cheesman*) (BMNH, London).

Paratypes. AMBOINA: 3 ♂ (*F. Muir*) (BPBM, Honolulu). MYSOL: 1 ♂ (*Saunders* collection) (BMNH, London). NEW GUINEA: 2 ♂, 1 ♀, Irian Barat, 'Komba' (?=Kumbe) (*L. Wagner*)

(SAM, Adelaide); 1 ♀, I. B., Paniai, 9.ix.1939 (*Nieuw Guinea Exp. K.N.A.G. 1939*) (RNH, Leiden); 9 ♂, 4 ♀, I. B., Star Range, 1500 m, bivak 39a, 28.vi.1959 (*Neth. New Guinea Expedition*); 2 ♂, 1 ♀, I. B., Star Range, 1260 m, Sibil, 16–18.vi.1959 (*Neth. New Guinea Expedition*); 1 ♂, I. B., Star Range, 1500 m, Ok Tenma, 19.v.1959 (*Neth. New Guinea Expedition*); 2 ♂, 1 ♀, I. B., Ifar, 300 m, 10.ix.1959 (*C. v. Heijningen, Neth. New Guinea Expedition*); 3 ♂, 2 ♀, I. B., Nabire, S. Geelvink Bay, 14.ix.1962, light-trap (*H. Holtman*); 1 ♂, I. B., Nabire, S. Geelvink Bay, 17.ix.1962, in jungle (*Holtman*); 1 ♂, I. B., Nabire, S. Geelvink Bay, 1–20 m, 5.vii.1962 (*J. L. Gressitt*); 1 ♀, I. B., Nabire, 5–50 m, 25.viii.–2.ix.1962 (*J. Sedlacek*); 3 ♂, I. B., Vogelkop, Jef Lio I., Sele Straits, 1–5 m, 15.viii.1957 (*D. Elmo Hardy*); 1 ♂, I. B., Vogelkop, Fak Fak, S. Coast of Bomberai, 10–100 m, 10.vi.1959 (*T. C. Maa*); 1 ♂, 1 ♀, I. B., Wisselmeren, Kamo-Debei div., 1700 m, 13.viii.1955 (*Gressitt*); 2 ♂, 1 ♀, I. B., Wisselmeren, 1500 m, Itouda, Kamo Valley, 13–14.viii.1955 (*Gressitt*); 1 ♂, 1 ♀, I. B., Bokondini, 40 km N. of Baliem Valley, c. 1300 m, 16–23.xi.1961 (*S. & L. Quate*); 1 ♂, 1 ♀, I. B., Kutisme, W. of Swart Valley, 1500 m, 14.xi.1958 (*Gressitt*); 2 ♀, I. B., Star Mts, Sibil Valley, 1245–1250 m, 18.x–8.xi.1961 (*S. & L. Quate*); 1 ♂, I. B., River Tor (mouth), 4 km E. of Hol Maffen, 3.vii.1959 (*Maa*); 1 ♂, 1 ♀, I. B., Kulima, 1400 m, 19–22.ii.1960 (*Maa*); 1 ♂, I. B., Central Mts, Archbold Lake, 760 m, 26.xi–3.xii.1961, by sweeping (*S. Quate*) (all in BPBM, Honolulu); 1 ♂, Papua New Guinea, Laloki, 10.ii.1956; 1 ♀, P. N.G., Lae, 6–7.ii.1966 (*G. Monteith*); 1 ♀, P. N.G., Passam via Wewak, Sepik district, 15.ii.1966 (*Monteith*) (all in UQ, Brisbane); 1 ♂, P. N.G., Wareo, Finsch Haven (*L. Wagner*) (SAM, Adelaide); 1 ♀, P. N.G., Maprik, 17.x.1957 (*J. Smart*); 4 ♂, 5 ♀, P. N.G., Madang District, Finistere Mts., Damanti, 3500 ft (1800 m), 2–11.x.1964 (*M. E. Bacchus*); 19 ♂, 28 ♀, P. N.G., Madang District, Finistere Mts, Moro, c. 5550 ft (1700 m), 30.x–15.xi.1964 (*Bacchus*) (all in BMNH, London); 14 ♂, 26 ♀, P. N.G., Eliptamin Valley, 1200–2530 m, 19.vi–15.ix.1959 (*W. W. Brandt*); 1 ♂, P. N.G., Morobe District, Wau, 1050 m, 5.i.1961 (*G. Monteith*); 1 ♂, P. N.G., Wau, 1100–1200 m, vii.1968 (*N. L. H. Krauss*); 1 ♂, P. N.G., Wau, 1200 m, 1.viii.1961 (*J. H. Sedlacek*); 3 ♀, P. N.G., Wau, 1200 m, 4.viii.1961 (*Sedlacek*); 1 ♂, P. N.G., Wau, 1200 m, 31.viii.1961 (*Sedlacek*); 1 ♀, P. N.G., Wau, 1200 m, 14.ix.1961 (*Sedlacek*); 1 ♂, P. N.G., Wau, 1200 m, 11–15.x.1961 (*Sedlacek*); 1 ♀, P. N.G., Wau, 1200 m, 7.i.1966 (*L. & M. Gressitt*); 1 ♂, P. N.G., Wau, 1200 m, 18.vii.1969 (*Y. Hirashima*); 6 ♂, 4 ♀, P. N.G., Wau, 1200 m, 29–30.ix.1963, m.v. light-trap (*Sedlacek*); 4 ♀, P. N.G., Wau, 1200–1300 m, 25.x.1965, Malaise trap (*Sedlacek*); 2 ♀, P. N.G., Wau, 1250 m, 25.vi.1961 (*Sedlacek*); 2 ♂, 1 ♀, P. N.G., Wau, 1250–1300 m, 20.viii.1961 (*Sedlacek*); 1 ♂, 2 ♀, P. N.G., Wau, 1350 m, 21.iv.1969 (*Sedlacek*); 2 ♂, 2 ♀, P. N.G., Wau, 1400 m, 17.vi.1961, one on grasses (*Sedlacek*); 4 ♂, P. N.G., Wau, 1500 m, 24.ix.1961 (*Sedlacek*); 1 ♀, P. N.G., Wau, 1600–1700 m, 28.xii.1961 (*Sedlacek*); 1 ♀, P. N.G., Wau, 2400 m, 9–12.i.1962 (*Sedlacek and others*); 4 ♂, 3 ♀, P. N.G., Wau, Mt Missim, 950–1300 m, 2.iii.1965 (*J. & M. Sedlacek*); 1 ♂, 2 ♀, P. N.G., Wau, Hospital Ck, 1250–1300 m, 7.iii.1965 (*Sedlacek*); 1 ♀, P. N.G., 24–32 km SE. of Wau, 1500–1900 m, 20.iii.1962 (*Sedlacek*); 2 ♂, 1 ♀, P. N.G., head of Wau Ck, 5000 m, 19.ix.1962 (*H. W. Clissold*); 1 ♂, P. N.G., Mt Missim, 1300 m, 25.iv.1968 (*Gressitt and others*); 2 ♀, P. N.G., Mt Missim, 1600–2000 m, 21–24.ix.1964 (*M. Sedlacek*); 9 ♂, 8 ♀, P. N.G., Lae, Singuawa R., 147° 10' E, 6° 45' S, 30 m, 1.iv.1966 (*G. Lippert*); 1 ♂, P. N.G., Lae, 10.iv.1966 (*O. R. Wilkes*); 1 ♂, 3 ♀, P. N.G., Lae, 11.iv.1966 (*P. Shanahan*); 1 ♂, P. N.G., Lae, 20 m, 7.xii.1963 (*Clissold*); 1 ♀, P. N.G., Lae, 30.i.1970 (*Sedlacek*); 1 ♀, P. N.G., Lae, sea level, 26.vii.1955 (*Gressitt*); 1 ♂, 2 ♀, P. N.G., Busu R., E. of Lae, 100 m, 14.ix.1955 (*Gressitt*); 3 ♂, P. N.G., Morobe District, Ulap, 800–1100 m, ix.1968 (*N. L. H. Krauss*); 1 ♂, P. N.G., Wewak, 0–100 m, viii.1968 (*Krauss*); 1 ♀, P. N.G., longai, 10 km E. of Mt Albert Edward, 1800–1850 m, 8–10.xi.1965 (*Sedlacek*); 2 ♂, 1 ♀, P. N.G., Madang, Matuka, 0–100 m, 1.x.1968 (*Krauss*); 1 ♂, 1 ♀, P. N.G., Madang, Amele, 0–100 m, 1.x.1968 (*Krauss*); 1 ♂, 2 ♀, P. N.G., Sinofi, 1590 m, 30 km S. of Kaimantu, 1–6.x.1959 (*T. C. Maa*); 2 ♂, 2 ♀, P. N.G., Korop, Upper Jimi Valley, 1300 m, 12.vii.1955 (*Gressitt*); 2 ♂, 1 ♀, P. N.G., Garaina, Saureli, 9–1400 m, 5.i.1968 (*J. & M. Sedlacek*); 1 ♂, P. N.G., Hagen Town, 4° 43' S, 144° 17' E, 1650 m, 30.v.1966 (*Gressitt*); 3 ♂, 3 ♀, P. N.G., East Highlands, Aiyura, 1700–1900 m, 6–9.i.1965 (*Sedlacek*); 1 ♂, 2 ♀, P. N.G., West Highlands, Baiyer R., 1150 m, 19.x.1958 (*Gressitt*); 1 ♂, 1 ♀, P. N.G., West Highlands, Korn Farm, 1560 m, 19.x.1958 (*Gressitt*); 1 ♀, P. N.G., Finistere Range, Saidor, Gabumi Village, 1–21.vii.1958 (*Brandt*); 2 ♀, P. N.G., Finistere Range, Saidor, Sibog Village, 27.v–5.vi.1958



(*Brandt*); 3 ♂, P. N.G., Purosa, 20–26 km SE. of Okapa, 1800–2200 m, 28.viii.1964 (*J. & M. Sedlacek*); 2 ♀, P. N.G., Okapa, Okasa, 1400–1650 m, 16.i.1966 (*Sedlacek*); 1 ♂, 1 ♀, P. N.G., 13 km SE. of Okapa, 1650–1870 m, 26.viii.1964 (*J. & M. Sedlacek*); 1 ♂, P. N.G., Maprik, 150 m, 29.xii.1960 (*Maa*); 2 ♂, 1 ♀, P. N.G., Sepik, Maprik area, 160 m, 23.viii.1957 (*D. Elmo Hardy*); 1 ♂, P. N.G., Sepik, Maprik area, 160 m, 28.viii.1957 (*Hardy*); 1 ♂, 1 ♀, P. N.G., Swart Valley, Karubaka, 1300 m, 7.xi.1958 (*Gressitt*); 3 ♂, P. N.G., Swart Valley, Karubaka, 1450 m, 12.xi.1958 (*Gressitt*); 1 ♀, P. N.G., Swart Valley, Karubaka, 1500 m, 20.xi.1958 (*Gressitt*); 1 ♂, P. N.G., Gewak, Salawakat Range, 1530 m, 7.ix.1956 (*E. J. Ford, Jr*); 1 ♀, P. N.G., Wampit V., nr Gurakor Village, 950 m, nr Wau, 7.vii.1957 (*Hardy*); 1 ♀, P. N.G., Wana, Upper Jimi Valley, 1500 m, 11.vii.1955 (*Gressitt*); 1 ♂, P. N.G., Bulolo, 1010 m, 21.viii.1956; 1 ♀, P. N.G., Bulolo R., 1130 m, 17.ix.1959 (*A. B. Mirza*); 1 ♀, P. N.G., Baiyumi R., 16 km N. of Bulolo, 500 m, 25.xi.1961 (*Sedlacek*); 1 ♂, P. N.G., Feramin, 150–120 m, 23–31.v.1959 (*Brandt*); 1 ♀, P. N.G., Huon Peninsula, Finschhafen, 50–150 m, 11.iv.1963 (no collector cited) (all in BPBM, Honolulu); 1 ♀, P. N.G., Kokoda, 1200 ft (350 m), viii.1933 (*L. E. Cheesman*); 2 ♂, 3 ♀, P. N.G., Popondetta, Agricultural Station, 15.viii.1962, feeding on *Desmodium distortum* (*A. Catley*) (all in BMNH, London); 1 ♂, 3 ♀, P. N.G., Moorhead, 18 m, 6.vii.1964 (*H. Clissold*); 1 ♂, 1 ♀, P. N.G., Owen Stanley Range, Goilala, Bome, 1950 m, 8–15.iii.1958 (*W. W. Brandt*); 1 ♀, P. N.G., Bome, 1950 m, 24.ii–7.iii.1958 (*Brandt*); 4 ♀, P. N.G., Goilala, Tororo, 1560 m, 21–24.iii.1958 (*Brandt*); 1 ♀, P. N.G., Goilala, Tapini, 975 m, 16–25.xi.1957 (*Brandt*); 5 ♂, 2 ♀, P. N.G., Aroa Estate, W. of Redscar Bay, 29.ix.1958, on grasses (*J. L. Gressitt*); 1 ♀, P. N.G., Popondetta, 25 m, v.1966 (*G. Lippert*); 1 ♀, P. N.G., Popondetta, 60 m, 1–4.ix.1963 (*J. Sedlacek*); 1 ♀, P. N.G., Popondetta, 24.ix.1963 (*Clissold*); 2 ♀, P. N.G., Popondetta District, Jumbora, 19.ix–15.x.1963 (*P. Shanahan*); 3 ♂, 4 ♀, P. N.G., Laloki, nr Port Moresby, 30.viii–2.ix.1959 (*T. C. Maa*); 1 ♀, P. N.G., Bisianumu, E. of Port Moresby, 500 m, ix.1955 (*Gressitt*); 1 ♂, P. N.G., Western District, Tala, 27.5 m, 13.vii.1964 (*Clissold*); 1 ♀, P. N.G., Subitana, 600 m, 20.v.1961 (*J. L. & M. Gressitt*); 1 ♀, P. N.G., Brown River, 5 m, 23.x.1960 (*J. L. Gressitt*); 4 ♂, 6 ♀, P. N.G., Iongai, 1700–1900 m, 9.xi.1965 (*Sedlacek*); 1 ♂, P. N.G., Mount Kaindi, 2350 m, 7.iv.1966 (*Gressitt*) (all in BPBM, Honolulu); 1 ♂, 1 ♀, P. N.G., Mt Lamington, 1300–1500 ft (400–600 m) (*C. T. McNamara*) (SAM, Adelaide); 1 ♂, 'New Guinea' (*Wallace*) (BMNH, London). ADMIRALTY ISLANDS: 1 ♂, 1 ♀, Manus, Lorengau, 7.vi.1967 (*R. E. & R. M. Blackith*) (BMNH, London); 4 ♂, 3 ♀, Manus, Lorengau, 15–21.vi.1962, one ♂ at m.v. light (*Noona Dan Expedition*) (UZM, Copenhagen). BISMARCK ARCHIPELAGO: 1 ♂, New Britain, Valoka, 4.vii.1962 (*Noona Dan Expedition*) (UZM, Copenhagen); 4 ♂, 3 ♀, New Britain, Gazelle Peninsula, Bainings, St Paul's, 350 m, 4–8.ix.1955 (*J. L. Gressitt*); 1 ♂, New Britain, Gazelle Peninsula, Gaulim, 140 m, 21–27.x.1962 (*J. Sedlacek*); 1 ♀, New Britain, Ti, Nakanai Mt, 28.vii.1956 (*E. J. Ford, Jr*); 1 ♂, New Britain, near Rabaul, ii.1929 (*Pemberton*) (all in BPBM, Honolulu). SOLOMON ISLANDS: 1 ♀, Bougainville, Kihili, nr Buin, 1 m, 31.v.1956 (*J. L. Gressitt*); 1 ♀, Bougainville, Kukugai Village, 150 m, xii.1960 (*W. W. Brandt*) (both in BPBM, Honolulu); 1 ♀, Bougainville, 6.vii.1922 (*E. A. Armytage*); 1 ♂, Guadalcanal, Kookoom (*R. A. Lever*); 1 ♀, Guadalcanal, Lunga, 29.iii.1934 (*Lever*); 1 ♀, Guadalcanal, Lunga, 4.iii.1935, on leaf of *Sida retusa* (*Lever*) (all in BMNH, London).

### *Gralliclava australiensis* sp. n.

(Figs 70, 79, 102, 108)

Length: ♂, 6.7–8.2 mm, mean 7.3 mm ( $n=12$ ); ♀, 7.6–8.6 mm, mean 7.9 mm ( $n=17$ ).

Similar to *G. horrens*. Ratio of lengths of antennal segments I : II : III : IV about 1.00 : 0.83 : 0.66 : 0.89; length of segment III divided by length of segment II 0.76–0.87, mean 0.85 ( $n=31$ ); length of segment I divided by width of head including eyes 1.08–1.32, mean 1.17 ( $n=37$ ). Pronotum with postero-lateral spines upcurved, width across tips of spines divided by width of head including eyes 2.41–2.86, mean 2.65 ( $n=32$ ). Male paramere (Fig. 79) with apex stout and strongly angled inwards; genital capsule (Fig. 70) with tongue broadly and shallowly produced, with small median emargination. Conjunctiva with distal dorsolateral lobes somewhat shorter than those of *G. horrens* but not as short as those of *G. indica* and its allies. Female second valvula (Fig. 102) and sclerites of gynatrium wall (Fig. 108) differing little from those of *G. horrens*. Colour, sculpture and pubescence as in other species of the genus except that female tergum IX is almost unicolorous stramineous, lacking a median macula. Posterior femur dark red in apical half, with 0–2 stramineous spots anteriorly and posteriorly.



REMARKS. Distinguished from all other species of the genus by the shape of the male paramere and tongue of genital capsule. The unicolorous tergum IX of the female is a constant character and serves to distinguish this sex of the species from its relatives. There are some morphometric differences between populations of this species in Queensland and in the Northern Territory. The principal ones are: ratio of antennal segments I : II : III : IV in Northern Territory about 1.00 : 0.84 : 0.67 : 0.89, in Queensland about 1.00 : 0.81 : 0.65 : 0.89; length of segment I divided by width of head in Northern Territory 1.08–1.28, mean 1.15 (n=22), in Queensland 1.11–1.32, mean 1.20 (n=15); width of pronotum divided by width of head in Northern Territory 2.41–2.86, mean 2.68 (n=18), in Queensland 2.48–2.70, mean 2.60 (n=14).

DISTRIBUTION. Tropical Australia.

MATERIAL EXAMINED. Holotype ♂, AUSTRALIA: Northern Territory, Darwin, Nightcliff, 2 m, 2.x.1960 (*J. L. Gressitt*) (BPBM, Honolulu).

Paratypes. AUSTRALIA: 3 ♂, 4 ♀, same data as holotype; 2 ♂, 6 ♀, Northern Territory, Darwin, Nights Cliff, 2 m, 2.ix.1960 (*J. L. & M. Gressitt*); 1 ♂, Northern Territory, Holmes Jungle, Palm Creek, 15 km NE. of Darwin, 5 m, 13.iii.1961 (*J. L. & M. Gressitt*); 1 ♀, Northern Territory, Darwin, E. Point, 23.ix.1958 (*J. L. Gressitt*); 3 ♂, 5 ♀, Northern Territory, Black Jungle, near Humpty-doo, 24.ix.1958 (*J. L. Gressitt*) (all in BPBM, Honolulu); 1 ♂, Northern Territory, Port Darwin (no other data); 1 ♀, Northern Territory, Darwin, 19.v.1913 (*G. F. Hill*) (both in BMNH, London); 1 ♀, Northern Territory, Darwin, 19.v.1913, on cucumbers (*G. F. Hill*); 1 ♀, Northern Territory, Darwin, 15.v.1914 (*G. F. Hill*); 2 ♀, Northern Territory, Darwin, Mitchell St, Mrs Eddy's garden, 6.i.1961 (*G. F. Gross*); 1 ♀, Northern Territory, Darwin (*G. F. Hill*); 1 ♂, Northern Territory, Port Darwin (no other data); 1 ♂, Northern Territory, Darwin (*W. K. Hunt*); 1 ♂, Bathurst I., x.1918 (*G. F. Hill*); 3 ♂, Melville I. (*W. D. Dodd*) (all in SAM, Adelaide); 1 ♂, Queensland, Cairns District (*F. P. Dodd*); 1 ♂, Queensland, Kuranda (*F. P. Dodd*) (both in SAM, Adelaide); 1 ♀, Queensland, Mackay, i.1899 (*A. J. Turner*); 1 ♂, Queensland, Townsville, Alligator Creek, 25.iv.1934; 1 ♀, Queensland, Kuranda, 1100 ft (345 m) 21.v–24.vii.1913 (*R. E. Turner*); 1 ♂, 2 ♀, no data but probably from Queensland (all in BMNH, London); 1 ♂, Queensland, Iron Range, Cape York Pen. 11–17.v.1968 (*G. Monteith*); 1 ♂, Queensland, Paluma Dam, 27.xii.1963 (*Monteith*); 1 ♂, Queensland, W. Normanby R., 40 miles W. of Cooktown, 2.i.1964 (*Monteith*); 1 ♀, Queensland, Koah, 14.ix.1959 (*G. Ettershank*); 1 ♀, Queensland, Ayr, 19.viii.1960 (*M. Breen*); 1 ♂, 2 ♀, Queensland, Airstrip, 27 km N. of Coen, 28.vi.1975 (*Monteith*); 1 ♂, 1 ♀, Queensland, Christmas Ck, 15 km W. of Fairview, via Laura, 26–27.vi.1975 (*Monteith*); 1 ♂, Queensland, Shiptons Flat via Helenvale, 20–27.vii.1974, ABRS Site 1, Rainforest, 198 m (*Monteith & D. Cook*); 2 ♀, Queensland, Dulhunty R. Xing, Cape York Pen., 27–28.ix.1974 (*Monteith*); 1 ♀, Queensland, Captain Billy Creek, Cape York Pen., 145° 50' E, 11° 40' S, 9–13.vii.1975 (*Monteith*); 1 ♀, Queensland, Dividing Range, 15 km W. of Captain Billy Creek, Cape York Pen., 142° 45' E, 11° 40' S, 4–9.vii.1975 (*Monteith*) (all in UQ, Brisbane).

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